ROCKY FLATS PLANT SOLAR EVAPORATION PONDS CLEANOUT PROJECT

A. Purpose and Scope

The purpose of the Rocky Flats Plant (RFP) Solar Evaporation Ponds (SEP's) cleanout project is to remove and solidify the sludge currently in Ponds 207A, 207B North, 207B Center, 207B South and 207C as well as the sludge in the clarifier tank near Building 788. The general location of these facilities within RFP is identified on Figure 1. The specific location of these facilities is identified in Figure 2.

The scope of this project includes the installation and operation of all solidification process equipment required to complete SEP cleanout. The process equipment will exist in two systems, one for the Pond 207C/clarifier tank and one for the 207A&B-series ponds. This document includes project activities beginning after pond water consolidation/chlorination (described previously in a DOE letter dated June 22, 1992) and ending with solidified pond sludge ready for off-site disposal. Final remediation of the SEP area will subsequently be accomplished under the Interagency Agreement (IAG).

The final waste product from this project will be certifiable to all storage, transportation and waste disposal requirements established by EPA regulations, DOT regulations and Nevada Test Site (NTS) Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO-325) of October 1988.

B. Process/Facility Description

1. Overview

The cleanout process will remove and treat the total contents of the SEP's. The SEP contents include liquid brine, sludge solids, salt crystals and water. The treatment activity is a chemical stabilization and solidification (CSS) process which will produce a stabilized certifiable waste form meeting all applicable requirements for transportation and permanent storage off-site.

Removal of excess water through evaporation will also be used during this process. Excess water removal will be maximized to reduce the amount of material produced by the CSS process.

The amount of SEP material requiring processing at the start of the cleanout may vary depending on evaporation, precipitation and potential operational constraints. The amount of SEP material requiring processing at the start of pond water consolidation is currently estimated as follows:

Source	Sludge to CSS Process*	Water to Evaporation*
207A	1.3	367
207B-North	112	1,254
207B-Center	38	1,440
207B-South	24	1,365
207C	456	0
Clarifier	27	0
Total	658.3	4426

* Thousands of gallons

The quantities of stabilized waste produced by this project are estimated as follows:

Source	Half-crates	External Volume of Half-crates (Cu. Yd.)
207A	45	94
207B-North	565	1,171
207B-Center	176	364
207B-South	263	546
207C	1,778	3,688
Clarifier	118	244
Total	2,945	6,107

2. Process Diagrams and Tables

The bases for the following CSS process description are the SEP cleanout block diagrams in Figures 3a and 3b and the SEP cleanout Process Flow Diagrams (PFD's) in Figures 4a and 4b. The PFD's include key instrumentation for process control and certification. Typical flow rates at various locations within the process are also included on the PFD's. The process equipment layout is shown in Figure 5.

3. CSS Process/Facility Description

a. 207 A&B Ponds CSS Process

The 207 A&B ponds CSS process begins after the 207 A&B pond water consolidation process previously described in the DOE letter referenced in item A above. The consolidation includes transferring 207A pond water and sludge to the 207B-Series ponds. The sludge in the 207B-Series ponds is then transferred to 207B-South for CSS processing while the water is transferred to 207B-North or 207B-Center for evaporation. The CSS process includes the following steps.

i. Reclaim

Reclaim is defined as sludge collection from 207B-South and water collection from 207B-North. A reclaim pump system will transfer 207B-North pond water to a process water tank for use in various stages of the 207 A&B ponds CSS process. The reclaimed sludge from 207B-South is pumped to a scalping screen where oversize and trash materials are removed by mechanical trash screenings. Oversize reclaimed material will be transferred to a half-crate for later disposition. 207B-South pond side walls will be flushed as needed with process water to remove residual sludge from the emptied pond. The undersize slurry will be pumped through a pipeline to surge tanks for gravity settling.

ii. Preconditioning

In the surge tanks, additional sludge and water separation occurs. Sludge material settles to the bottom of the tank, while water flows over an internal weir. The water is pumped back to the pond while the sludge is mixed with a polymer flocculant in preparation for dewatering downstream of the tank.

iii. Dewatering

A rotary screen thickener dewaters and densifies the preconditioned low-density sludge material. The densified sludge is transferred from the thickener to a slurry surge tank which feeds the cement mixer. The excess water is sent to the water separator for processing.

iv. Pozzolan Staging and Mixing

Pozzolan (cement, flyash, and lime reagents) is brought by truck to storage bins located near the 750 Pad. The pozzolan reagents are mixed off-site in carefully proportioned amounts and trucked to the project storage bins ready for cementing.

v. Cementing

Mixing of the SEP materials and pozzolan occurs in a pug mill-type cement mixer. The SEP materials are blended with pozzolan in carefully controlled proportions. The output of the cement mixer is transferred to the casting station as a castable cement mixture. The process is designed to fill one half-crate every 3 to 10 minutes.

The cement mixer must undergo a cleaning process every two to three hours. During cleaning, the cement mixer is emptied and flushed with water. Multiple water flushes and high-pressure water jets may be needed to clear material accumulations. The cleaning wastewater is transferred to a water separator for

processing. Oversize material from cleanings will be transferred to a half-crate for later disposition.

vi. Casting

Empty half-crates are brought to the casting area by forktruck. The lids are removed and the liners are prepared to receive the castable cement mixture. The half-crates are filled by a nozzle leading from the cement mixer. The inner liners are closed and lids are fastened in place. Steel banding is then applied around the half-crates. Process surveillance is provided by waste inspectors and radiation protection technologists. The half-crates are then transported to the storage area.

vii. Curing and Storage

The filled half-crates will be moved by fork truck from the casting area to the 750 Pad for curing and storage. The crates will remain in storage on the pad until shipment to NTS for disposal.

b. 207C Pond and Clarifier CSS Process

i. Reclaim

Reclaim is defined as sludge and water collection from 207C and the clarifier tank. The 207C Pond and clarifier contents will be reclaimed using a Lefco Sludge Buster Boom Truck. The reclaimed material is pumped as a slurry to a scalping screen where oversize and trash materials are removed by mechanical trash screenings. Oversize reclaimed material is directed to a half-crate for later disposition. Pond side walls are flushed as needed with process water to remove residual sludge from the emptied pond. The undersize slurry is pumped to an averaging tank. The clarifier reclaim will be blended in small proportions with the 207C pond materials in downstream averaging tanks.

ii. Disinfection

After reclaim, the 207C pond materials will be piped from the averaging tank to a chlorine contact chamber for calcium hypochlorite disinfection. Clarifier materials will be disinfected within the clarifier tank before the removal to the averaging tanks.

iii. Averaging Tanks

Several sets of averaging tanks will be used in the process. Averaging tank 1 will receive 207C Pond materials which are subsequently fed to the contact chlorination chamber. Brine from 207C is used to adjust TSS (Total Suspended

Solids) in tank 1. TSS and TDS (Total Dissolved Solids) are monitored and adjusted in tanks 2 and 3 as needed. TDS is adjusted with RFP process water.

Following these adjustments, the slurry is piped to the 750 Pad area to Averaging Tanks 4/5 and 6/7. These averaging tanks are used for further TSS and TDS adjustments and for slurry batch feed to the RCM (recirculating cement mixer). While one pair of these tanks is filling, the other pair is feeding the RCM.

iv. Pozzolan Staging and Mixing

Pozzolan staging and mixing will be conducted as described above for 207A and B ponds processing.

v. Cementing and Casting

Cementing and casting will be conducted as described above for 207A and B Ponds processing, except the RCM will be used for mixing instead of a pug mill mixer. Like the pug mill cement mixer, the RCM must undergo a cleaning process every two to three hours. During cleaning, the RCM is emptied and flushed with water. Multiple water flushes and high-pressure water jets may be needed to clear material accumulations. The cleaning wastewater is transferred to a water separator for processing. Oversize material from cleanings will be transferred to a half-crate for later disposition.

vi. Curing and Storage

The filled half-crates will be moved by fork truck from the casting area to the 750 Pad for curing and storage. The crates will remain in storage on the pad until shipment to NTS for disposal.

C. Process Envelope Requirements

To produce a certifiable product, the stabilization operation will be conducted within a process operating envelope previously proven in a laboratory. Halliburton NUS has developed process formulas which demonstrate compliance with NTS requirements, Land Disposal Restrictions (TCLP) and Department of Transportation requirements. In addition to meeting the regulatory requirements, lab samples of the formulas have also passed durability tests using ASTM wet/dry and freeze/thaw procedures.

These recipes are based on a specified amount of pozzolans added to the waste stream such that the ratio of free water to pozzolans falls within a defined regime. Other parameters necessary for a complete definition of the operating envelope are the TDS, TSS and TS (Total Solids) of the feed stream. The recipes for stabilization of the contents of all SEP's have been calculated and are available in the Process Control Plan (PCP).

D. Operating procedures

Operation of all equipment in this project will follow the appropriate approved procedure. Operational activities shall comply with all Operating Instructions (O/I's), the PFD's and process description above, PCP's, Health and Safety Plans (HSP's) and System Operational (S.O.) Test Procedures.

E. Process Verification

The Site Specific QA Plan (SSQAP) specifies the procedures and requirements which must be met to produce a certifiable waste product. The flow charts for process control of the SEP cleanout project are shown in Figures 6a and 6b. Process verification includes the following features.

1. Process Verification Program

Instrumentation, periodic sampling and lab analysis will be used for verification in accordance with the PCP and the SSQAP. Also, an automatic data logging system will be used during the mixing and casting process. This system will record pertinent data points including (but not limited to) slurry characteristics (temperature, density, flow rate), batch tank TDS and TSS readings, process output characteristics (density, batch number, time).

2. Project Phases

The SEP cleanout project will be implemented in the following phases to facilitate process verification.

a. Installation

The equipment arrives on site and is installed by either the equipment supplier or a sub-contractor.

b. Inspection

The installation of each piece of equipment is validated to be in accordance with the manufacturer's requirements, construction drawings and appropriate site requirements. Any deficiencies require correction prior to advancing to the check-out phase.

c. Check-out

The check-out phase will validate individual equipment operation. Procedures and O/I's will also be checked out through a visual inspection of the actual

equipment. When all equipment is determined to be ready for operation and the O/I's are verified, the process train is ready for cold system check-out as a part of S. O. testing.

d. Test Operations

i. System Operational (S. O.) Test

S. O. testing is the first time the process train is operated as a system. RFP raw water will be used to validate system operation. Testing will also demonstrate that the controls, instrumentation and O/I's support producing a certifiable final waste product. During operation all O/I's associated with the system are validated. Any problems identified (either equipment or procedural) are corrected and the appropriate tests are repeated before moving to the next level of testing.

ii. Hot System Test

Hot system testing will test the total system operations and O/I's using actual waste material. All provisions of the cold tests apply. The end product will be thoroughly analyzed to ensure compliance with certification requirements.

e. Operations

The equipment will be operated strictly in accordance with the approved O/I's.

f. Inspection

The waste product will be tested for waste certification with samples from the casting station. Samples are taken in accordance with the Waste Analysis Plan (WAP). TSS and TDS measurements are also taken in accordance with the PCP at various locations to validate process control.

3. On-site Lab

An on-site laboratory will be located within a permacon inside one of the tents on the 750 Pad. The laboratory will perform required product certification testing, instrumentation verification testing and testing for process monitoring. In addition the laboratory will package samples for off-site chemical certification testing.

4. Non-conformance Control

The SSQAP addresses non-conformance. Any non-conformance found through sampling and analysis will be identified as an administrative or physical non-compliance. Appropriate root cause analysis and corrective action will be completed

in accordance with the SSQAP.

F. Safety Features

1. Health and Safety Plan (HSP)

Site safety provisions for this project are specified in the HSP. Some of the main sections of the HSP include hazard assessment, hazard communication, site control, personnel protection, material handling safety, decontamination procedures, medical surveillance, health and safety monitoring, training and emergency response. The HSP was prepared in accordance with 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response) and 29 CFR 1910.1200 (Hazard Communication).

2. Engineering Controls for Environmental and Worker Protection

Equipment design and installation will incorporate features for environmental and worker protection. Field operators will be physically isolated from pond material by remotely controlled equipment. Double-walled piping, properly-sized spill containment pans and the existing pond berms will provide spill prevention. The scalping screen equipment will be enclosed for splash control. Tanks will be constructed with high level sensors and alarms where appropriate. Tanks will also have secondary containment. All secondary containment will be sized in accordance with 6 CCR 1007-3, Part 264. The RCM and pug mill cement mixer will be in enclosures which contain dust and wash water overspray. Also, in addition to the half-crate liners, special "bladders" will be used at the RCM process outlet. These bladders will receive the waste product during each half-crate fill and will provide an additional protective barrier. Finally, ambient and surface radioactivity will be monitored during operations.

3. Emergency Shutdown Provisions

A number of scenarios may cause emergency shutdown of operations. The time available to effect shutdown (immediately to 15 minutes) may vary dependant on the reason for the shutdown. Shutdown options available to the operators include evacuating the wetted cement pipelines and the RCM into half crates or a batch tank. The O/I's will include provisions for these options.

The types of possible shutdowns include:

- High winds
- Weather alert
- Security alert
- Electrical failure
- Mechanical failure
- Personnel hazard/injury

- Reportable Quantity spill
- Data logging system failure

Emergency shutdowns will not be considered as non-conformances to the Operating Parameters. Any out-of-specification materials resulting from above will be either incorporated back into the processing train or set aside for reprocessing.

4. Fire Protection and Safety Equipment

Fire extinguishers will be provided throughout the SEP cleanout process area. Adequate emergency communications equipment (phones and radios) will be available throughout the project site. Safety shower and eye wash equipment will be installed as specified in the site-specific safety plans. Adequate audible fire alarms exist at the site. The RFP fire department is also available as needed.

Process alarms will include high level alarms, power overload alarms and loss of vacuum alarms.

5. Inspections

All inspections and tests will be conducted in strict compliance with the approved procedures for operation of the system, the RFP Hazardous Waste Requirements Manual (1-10000-HWR) and the Colorado hazardous waste regulations (6 CCR 1007-3). All personnel qualified to conduct inspections or tests will have completed the subcontractor Quality Training Course. Personnel performing inspections and testing activities shall not review their own work or inspect project site areas they may be responsible for. Surveillance Reports and Instrument Verification Reports shall be used to record inspection activities. Hazardous waste tank systems will be inspected daily while hazardous waste storage containers will be inspected at least weekly per RCRA requirements.

G. Waste Analysis Plan (WAP)

The pondcrete waste product from the CSS process will be sampled and analyzed to demonstrate compliance with storage and disposal requirements. Waste analysis provisions are specified in the WAP. The WAP includes requirements and explanations of sampling approach, sampling frequency and analysis criteria.

H. Personnel Training

Training is itemized in the HSP. Personnel are trained as appropriate for individual job responsibilities prior to performing project assignments. Training includes (but is not limited to) OSHA hazardous waste operations instruction, hazard communication, emergency preparedness/response, radiation worker safety, respirator fit/use, RCRA regulations, industrial safety, fire protection and lockout/tagout.

I. Compliance with RCRA Permit

The SEP cleanout project complies with sections from the RFP state RCRA permit CO7890010526, in particular Part I (Standard Conditions), Part II (General Facility Conditions), Part IV (Waste Analysis Plan), Part V (Procedures to Prevent Hazards), Part VI (Contingency Plan) and Part VII (Personnel Training). Also, the waste codes for the SEP cleanout project are reflected in the current RFP Part A Application for Unit 48 (Pondcrete Solidification Process).

The SEP cleanout project also complies with Part III (Treatment and Storage Units), with the exception that the half-crate waste containers can be safely stacked up to 5 high (versus 3 high in the permit).

J. Project Schedule

The most recent SEP cleanout schedule is shown in Figure 7.

Figure 1
Rocky Flats Plant Operational Areas

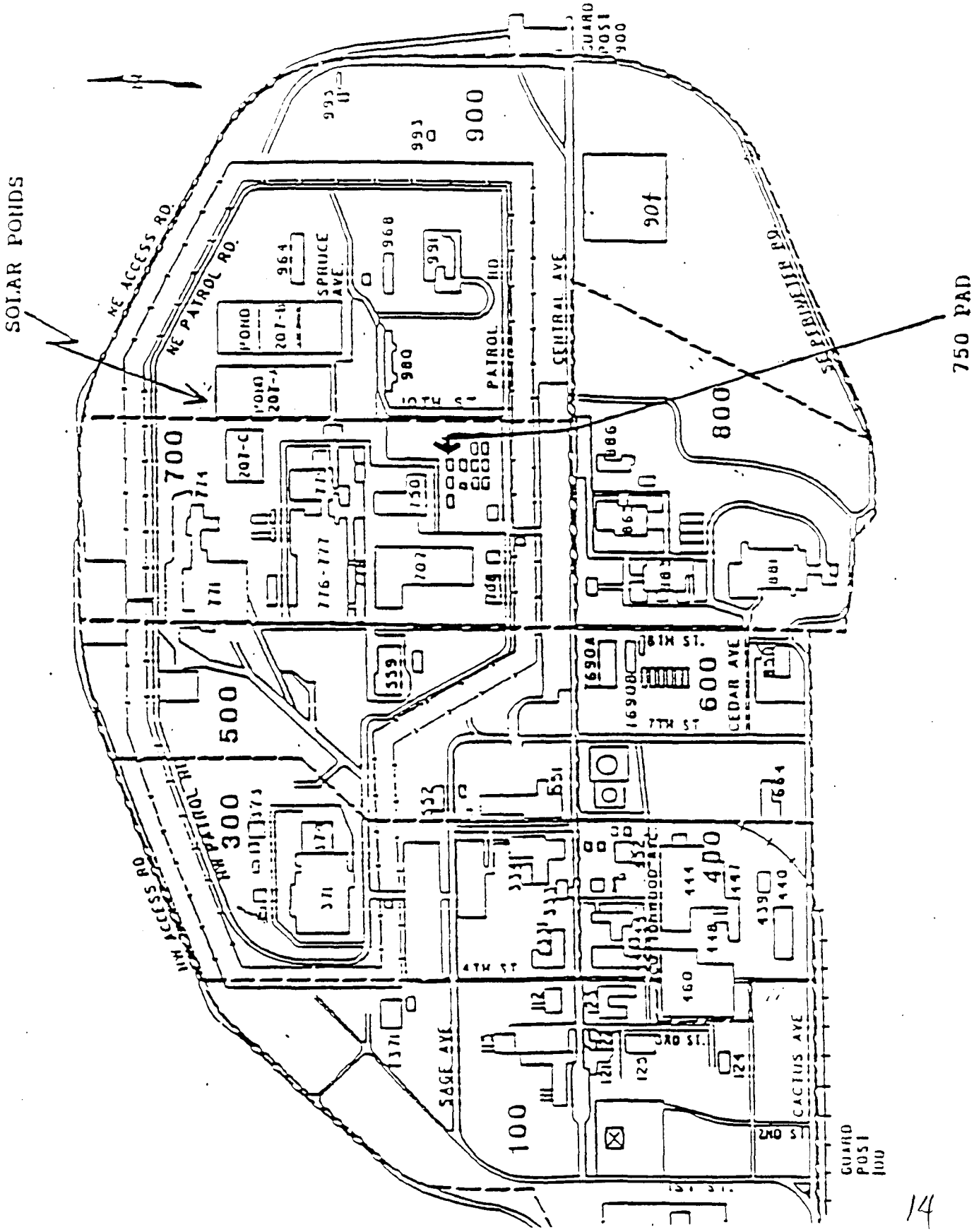

Figure 2
Solar Ponds Processing Area

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MAY 8, 1992

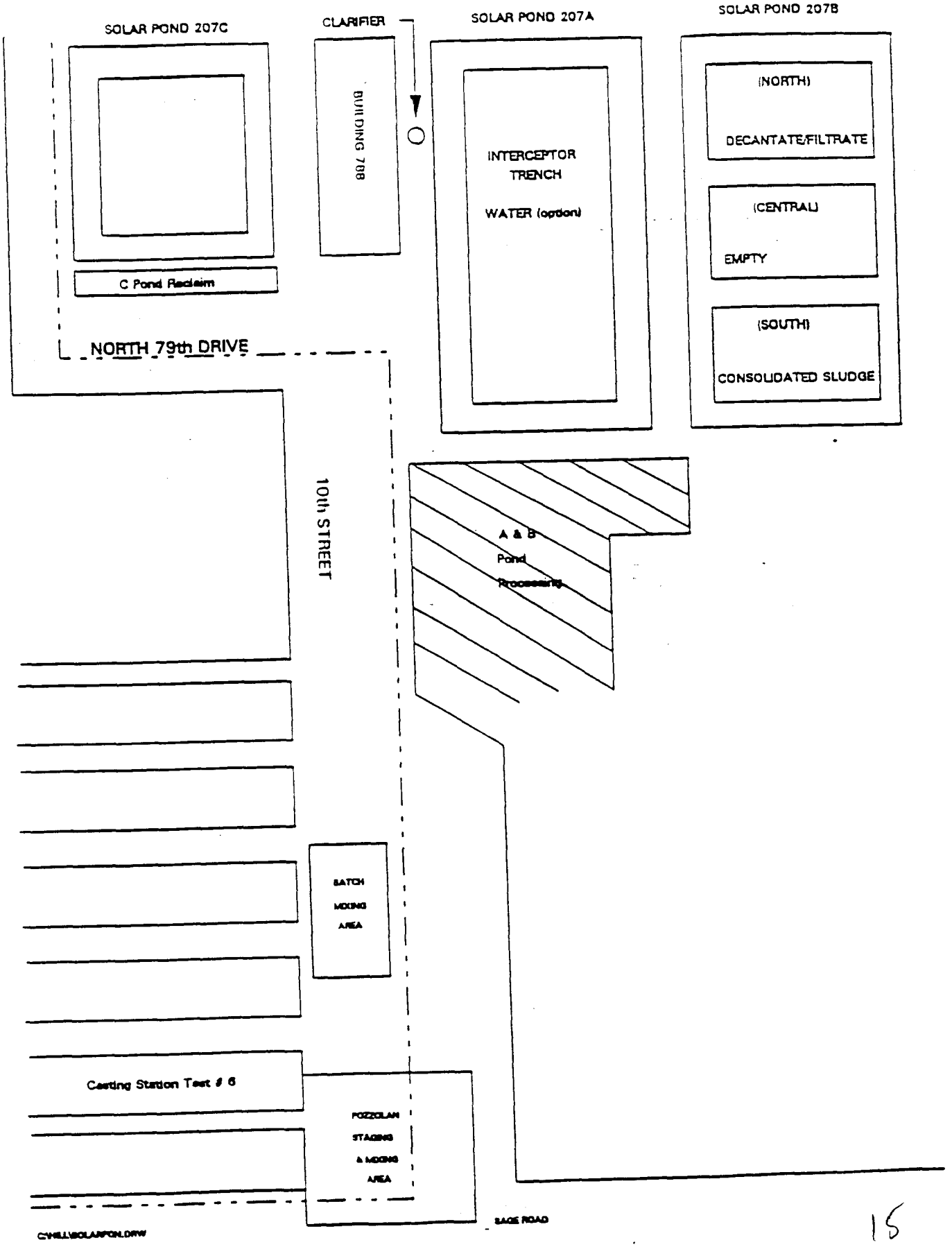

Figure 3a
Ponds 207A and B-Series CSS Block Diagram

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MAY 8, 1992

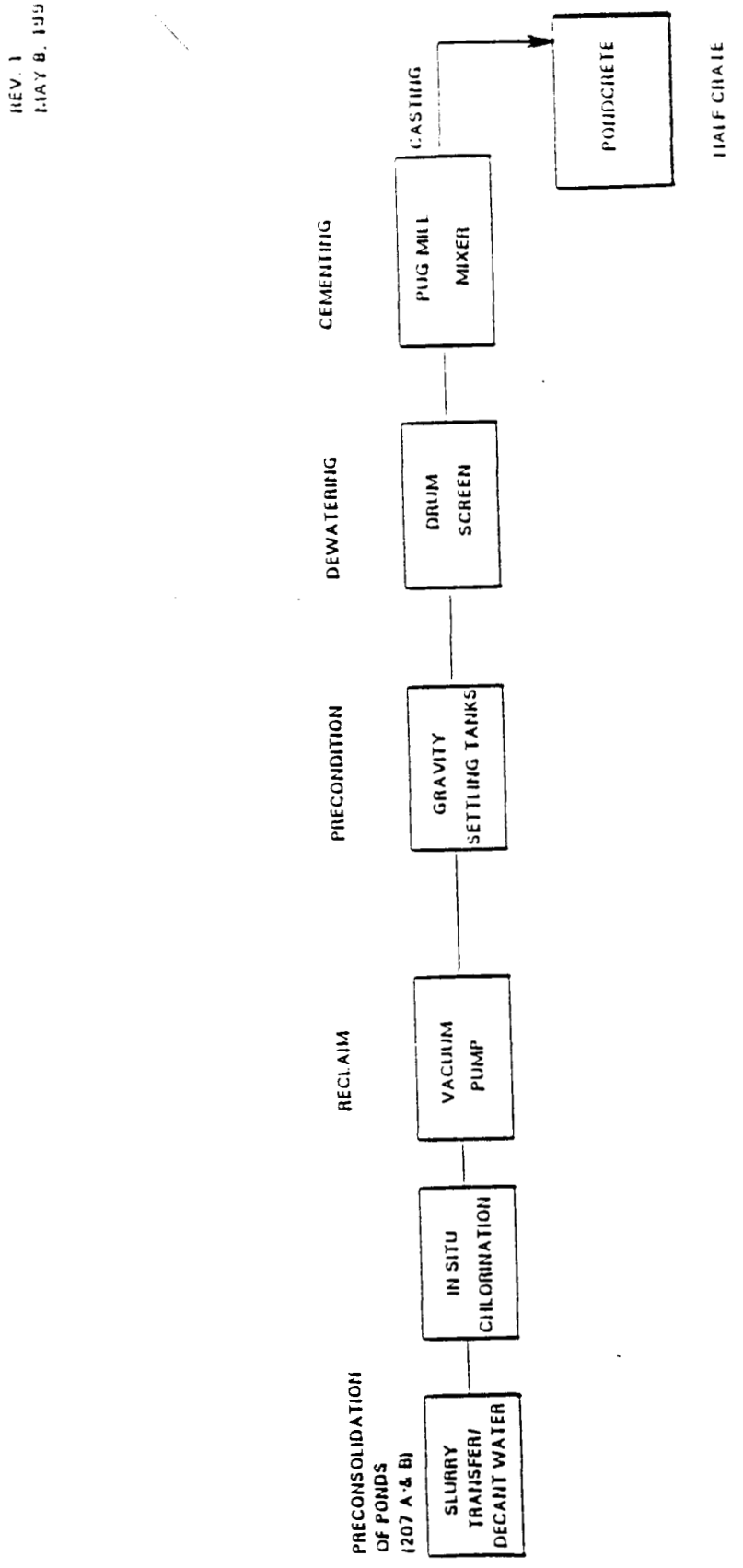

Figure 3b
Ponds 207C and Clarifier CSS Block Diagram

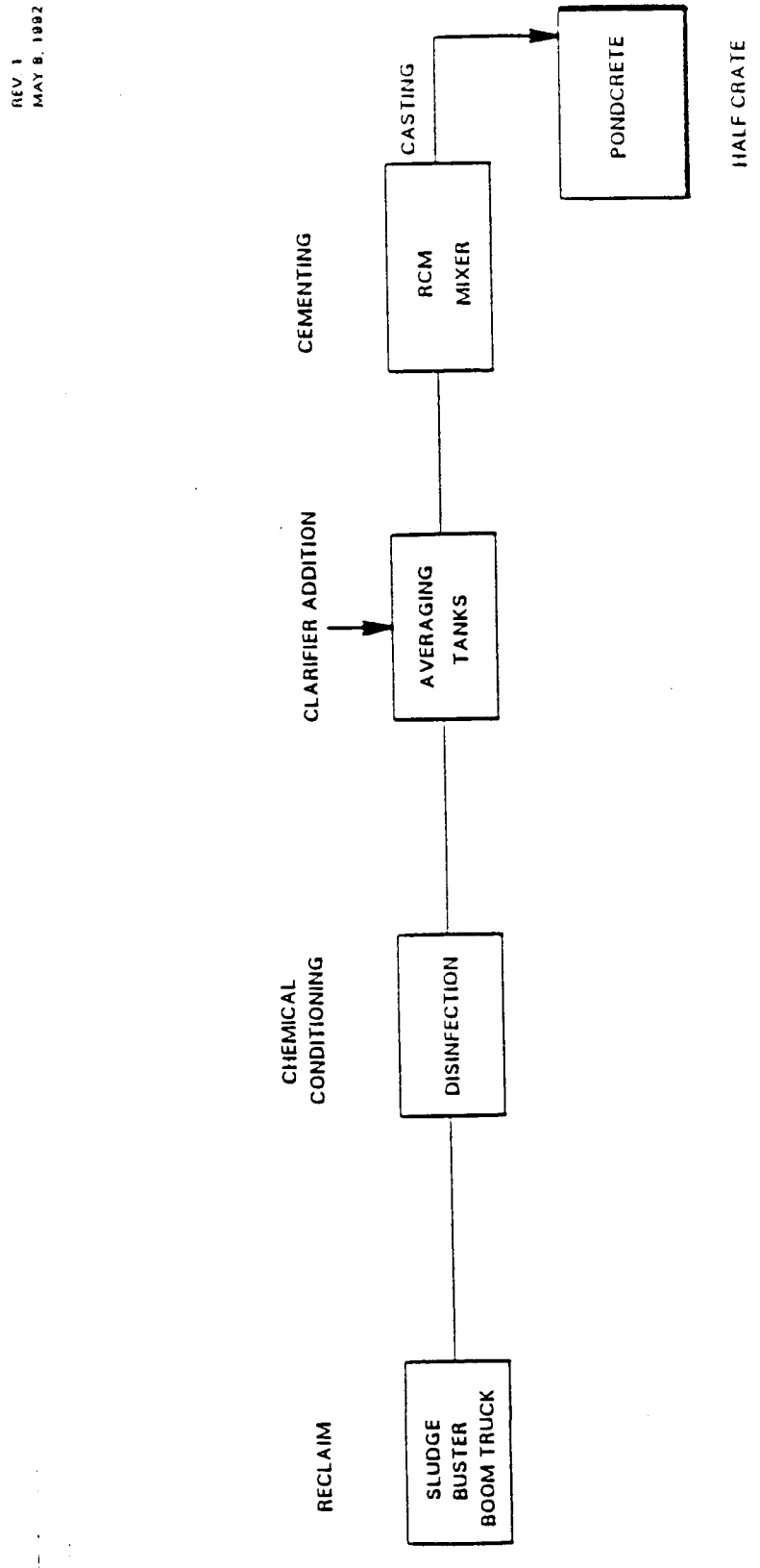

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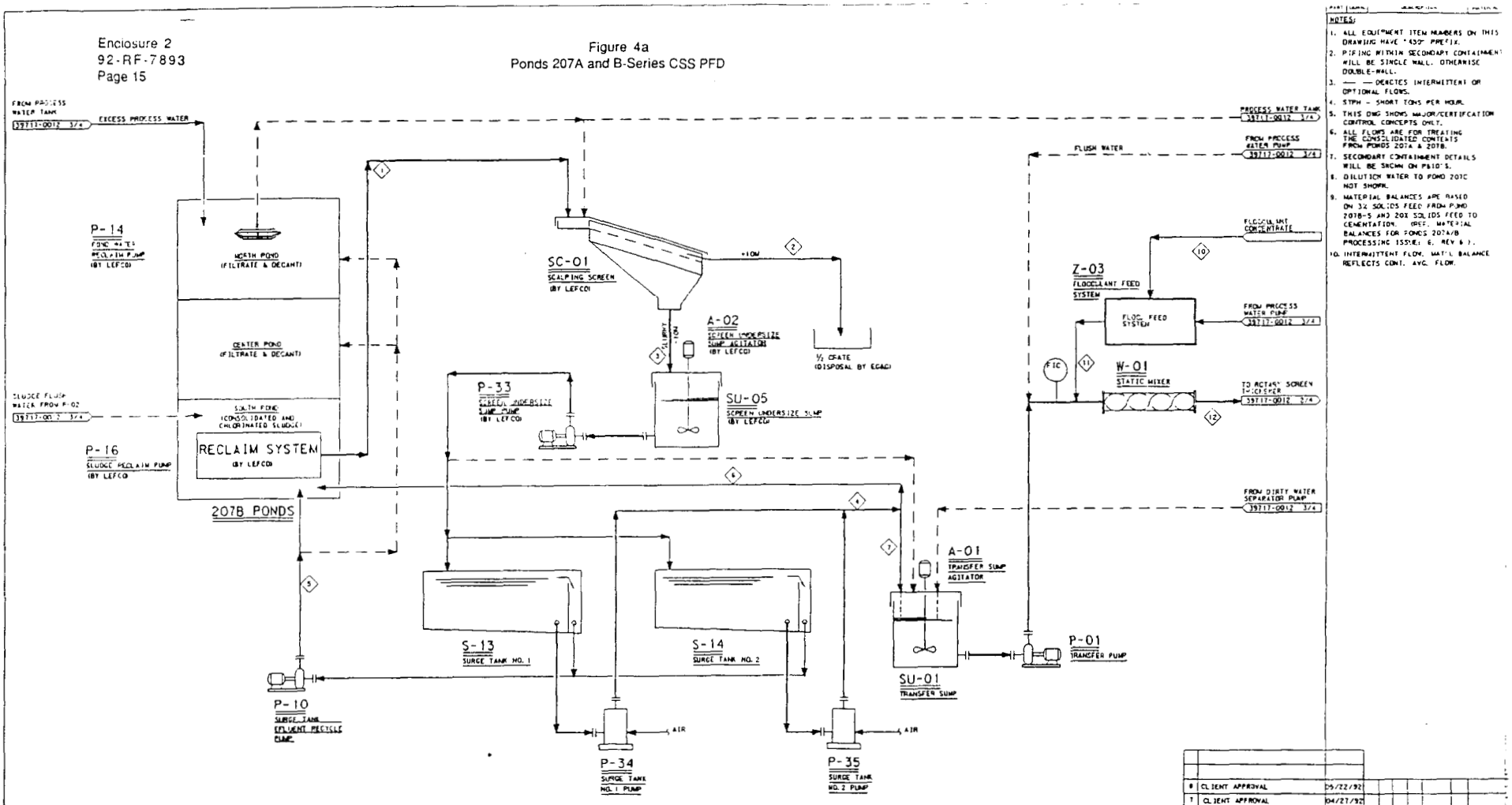
Figure 4a
Ponds 207A and B-Series CSS PFD



NOTES:
1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "430" PREFIX.
2. PIPING WITHIN SECONDARY CONTAINMENT WILL BE SINGLE WALL. OTHERWISE DOUBLE-WALL.
3. ——— DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH = SHORT TONS PER HOUR.
5. THIS DWG SHOWS MAJOR/CERTIFICATION CONTROL CONCEPTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE CONSOLIDATED CONTENTS FROM PONDS 207A & 207B.
7. SECONDARY CONTAINMENT DETAILS WILL BE SHOWN ON P&ID'S.
8. DILUTION WATER TO POND 207C NOT SHOWN.
9. MATERIAL BALANCES ARE BASED ON 3% SOLIDS FEED FROM POND 207B-S AND 20% SOLIDS FEED TO CEMENTATION. (REF. MATERIAL BALANCES FOR PONDS 207A/B PROCESSING ISSUE: 6, REV 6.).
10. INTERMITTENT FLOW. MAT'L BALANCE REFLECTS CONT. AVG. FLOW.

NOTE: 4, 9

DESCRIPTION	STRM NO. / UNITS	1	2	3	4	5	6	7	8	9	10	11	12
TOTAL FLOW	STPH	20.61	0.008	20.60	10.25	10.36	1.65	8.61	8.79	0.0015	0.76	9.55	
SOLIDS FLOW	STPH	0.62	0.003	0.62	0.62	0.00	0.10	0.52	0.54	0.0015	0.00	0.54	
LIQUID FLOW	STPH	19.99	0.005	19.98	9.63	10.36	1.55	8.09	8.25	0.00	0.76	9.01	
TOTAL FLOW	GPM	80.0	0.03	80.0	38.2	40.8	6.3	32.9	33.6	-	3.0	36.6	
SOLIDS WT%	WT%	3.00	36.27	2.99	6.00	0.00	6.00	6.00	6.19	100.00	0.00	5.69	
SOLIDS S. G.	-	2.10	2.10	2.10	2.10	-	2.10	2.10	2.10	-	-	2.10	
SLURRY S. G.	-	1.03	1.26	1.03	1.05	1.01	1.05	1.05	1.05	-	1.01	1.04	

NO.	DESCRIPTION	BY	CHKD	APPD
8	CLIENT APPROVAL	DRB	WCH	HH
7	CLIENT APPROVAL	DRB	WCH	HH
6	CLIENT APPROVAL			
5	CLIENT APPROVAL			

NO.	DESCRIPTION	DATE
8	CLIENT APPROVAL	05/22/92
7	CLIENT APPROVAL	04/27/92
6	CLIENT APPROVAL	04/15/92
5	CLIENT APPROVAL	03/30/92

KEYWORDS:
1. POND SLUDGE
2. POND SLUDGE
3. STABILIZATION
4. RECLAIM
5. FLOW DIAGRAM
6. CONCRETE

HALLIBURTON NUS Environmental Corporation

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE, GOLDEN, COLORADO
Rocky Flats Plant
GOLDEN, COLORADO
SOLAR POND/PONDCRETE STABILIZATION PROJ.
POND SLUDGE-PROCESS FLOW DIAGRAM
PONDS 207 A&B SLUDGE RECLAIM SYSTEM

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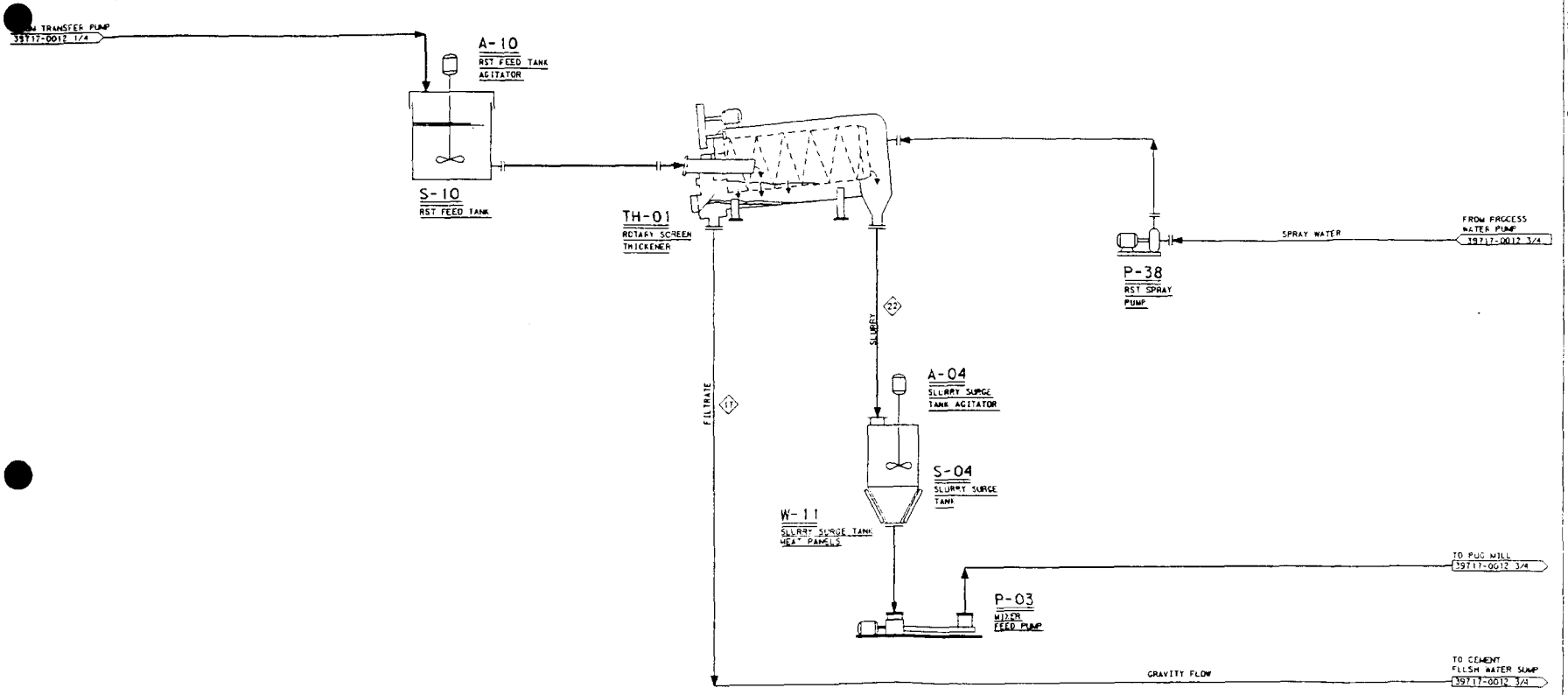

NOTES:

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3. — — DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH = SHORT TONS PER HOUR.
5. THIS DRW SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE CONSOLIDATED CONTENTS OF 207A & 207B PONDS.
7. SECONDARY CONTAINMENT DETAILS WILL BE SHOWN ON P&ID'S.
8. DILUTION WATER TO POND 207C NOT SHOWN.
9. MATERIAL BALANCES ARE BASED ON 3% SOLIDS FEED FROM POND 207B-S AND 20% SOLIDS FEED TO CEMENTATION. (REF. MATERIAL BALANCES FOR PONDS 207A/B PROCESSING ISSUE: 6, REV. 6).
10. INTERMITTENT FLOW. MATL BALANCE REFLECTS CONT. AVG. FLOW.

NOTE: 4, 9

DESCRIPTION	STRM NO. / UNITS	17	22
TAL FLOW	STPH	10.52	2.58
IDS FLOW	STPH	0.03	0.52
QUID FLOW	STPH	10.49	2.06
TAL FLOW	GPM	41.4	9.1
IDS WTX	WTX	0.26	20.0
IDS S. G.	-	2.10	2.10
URRY S. G.	-	1.01	1.13

NO.	REVISION	BY	CHK'D	APP'D
8	CLIENT APPROVAL	DRB	WCH	HH
7	CLIENT APPROVAL	DRB	WCH	HH
6	CLIENT APPROVAL			
5	CLIENT APPROVAL			

NO.	DESCRIPTION	DATE
8	CLIENT APPROVAL	05/18/92
7	CLIENT APPROVAL	04/27/92
6	CLIENT APPROVAL	04/15/92
5	CLIENT APPROVAL	03/30/92

KEYWORDS
1. POND SLUDGE
2. 207AB PONDS
3. STABILIZATION
4. DEWATERING
5. P & ID DIAGRAM

HALLIBURTON NUS Environmental Corporation

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/PONDCRETE STABILIZATION PROJ.
POND SLUDGE - PROCESS FLOW DIAGRAM
PONDS 207 A&B CONDITIONING AND DEWATERING

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CHECKED: WCH 04-24-92
APPROVED: HH

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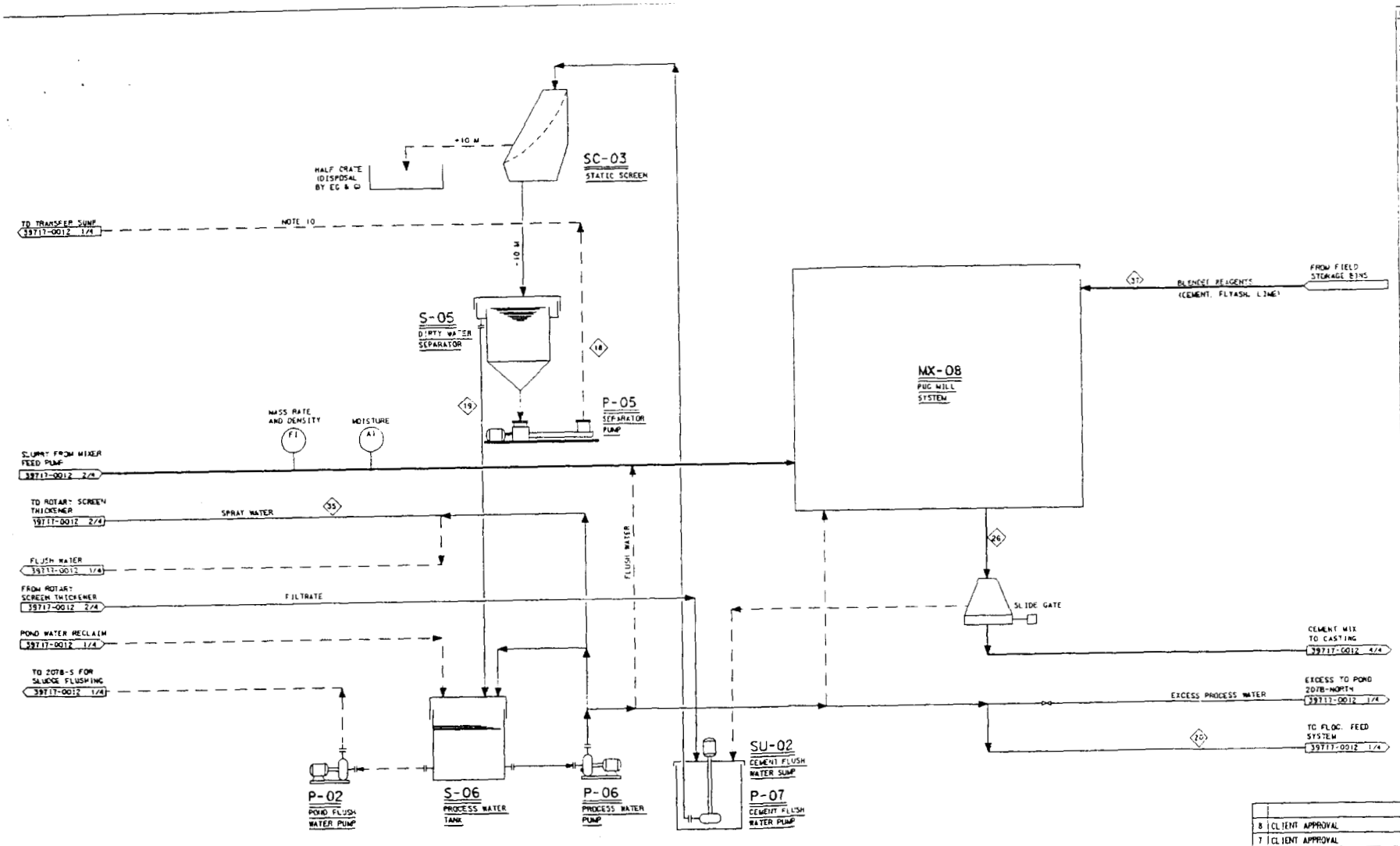

NOTES:

1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "03" PREFIX.
2. PIPING WITHIN SECONDARY CONTAINMENT WILL BE SINGLE WALL. OTHERWISE DOUBLE-WALL.
3. — — DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH - SHORT TONS PER HOUR.
5. THIS DWG SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE CONSOLIDATED CONTENTS OF 207A & 207B PONDS.
7. SECONDARY CONTAINMENT DETAILS WILL BE SHOWN ON P&ID'S.
8. DILUTION WATER TO POND 207C NOT SHOWN.
9. MATERIAL BALANCES ARE BASED ON 3% SOLIDS FEED FROM POND 207B-S AND 20% SOLIDS FEED TO CEMENTATION. (REF. MATERIAL BALANCES FOR PONDS 207A/B PROCESSING ISSUED 6, REV. 6).
10. INTERMITTENT FLOW. MAT'L BALANCE REFLECTS CONT. AVG. FLOW.

NOTE: 4, 9

RIPTION	STRM NO. / UNITS	18	19	20	26	35	37
TAL FLOW	STPH	0.18	10.34	0.76	7.50	3.56	4.92
LIDS FLOW	STPH	0.03	-	0.00	5.43	0.00	4.92
QUID FLOW	STPH	0.15	10.34	0.76	2.07	3.56	0.00
TAL FLOW	GPM	0.7	40.8	3.0	16.0	14.0	-
LIDS WT%	WT%	15.01	0.00	0.00	72.46	0.00	100.00
LIDS S. G.	-	2.10	-	-	2.75	-	2.85
URRY S. G.	-	1.16	1.01	1.01	1.87	1.01	-

NO.	ISSUE	BY	DWTD	APPD
8	CLIENT APPROVAL	DRB	WCH	HH
7	CLIENT APPROVAL	DRB	WCH	HH
6	CLIENT APPROVAL			
5	CLIENT APPROVAL			

NO.	DESCRIPTION	DATE	APP	DOC CLASS	JOB NO.
8	CLIENT APPROVAL	05/18/92			
7	CLIENT APPROVAL	04/27/92			
6	CLIENT APPROVAL	04/15/92			
5	CLIENT APPROVAL	02/20/92			

KEYWORDS
1. PONDS 207A/B
2. POND SLUDGE
3. PUG MILL
4. CASTING
5. FLOW DIAGRAM
REVIS/FACILITY

HALLIBURTON NUS Environmental Corporation

	BY	DATE
DESIGNED	DRB	03/13/92
DRAWN	RL	02/23/92
CHECKED	WCH	04/24/92
APPROVED	HH	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/PONDCRETE STABILIZATION PROJ.
POND SLUDGE PROCESS FLOW DIAGRAM
PONDS 207-A/B PUG MILL AND CASTING

SIZE D | DRAWING NUMBER 39717-0012 | REV 8 | SHEET 3 of 4

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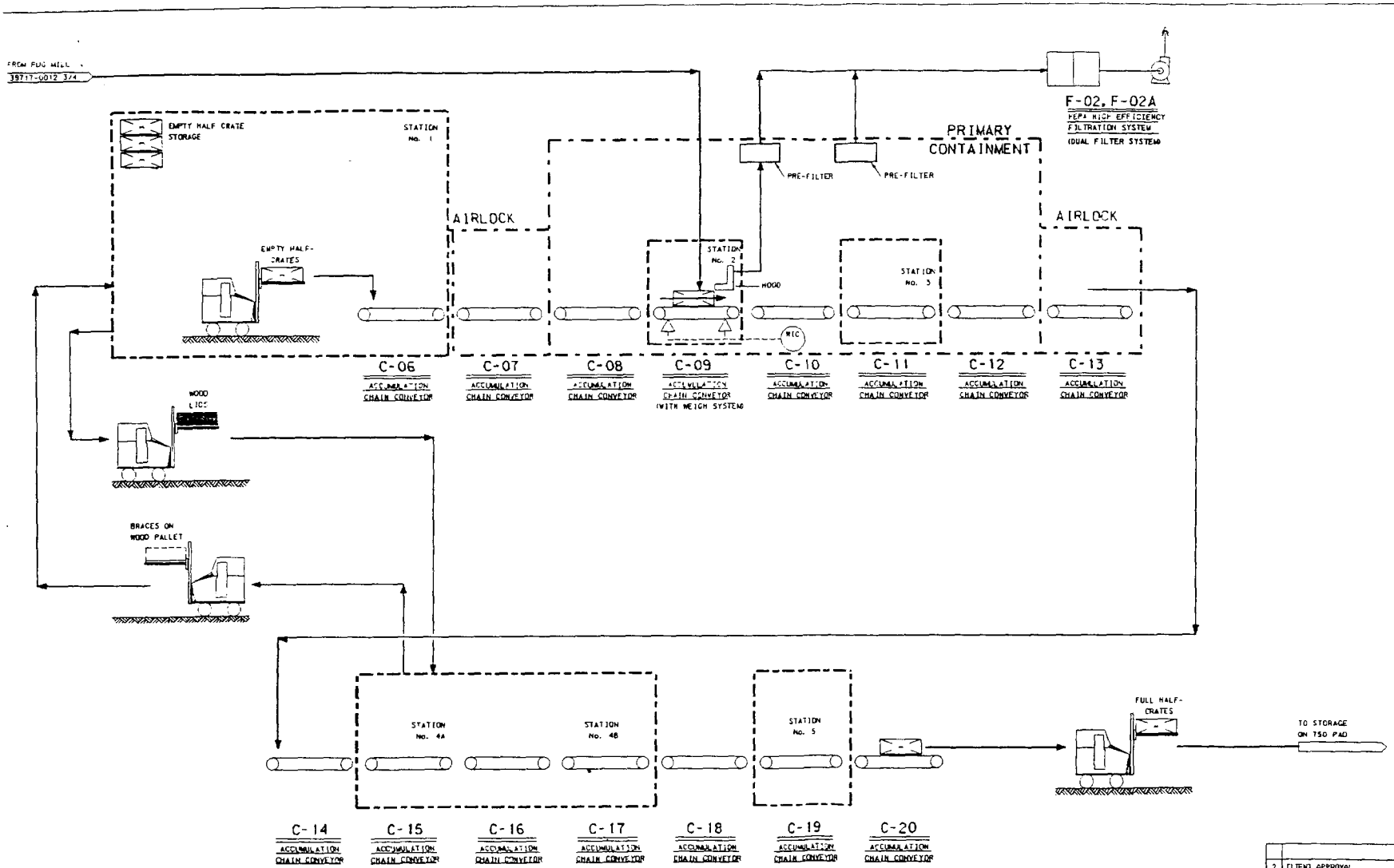

NOTES:

1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "430" PREFIX.
2. STPH - SHORT TONS PER HOUR.
3. THIS DRAWING SHOWS MAJOR CERTIFICATION INSTRUMENTS ONLY.
4. STATION DESIGNATIONS:
   - No. 1 EMPTY HALF CRATE STORAGE AND ASSEMBLY
   - No. 2 POURING AND INSPECTION
   - No. 3 BAG CLOSURE AND INSPECTION
   - No. 4 CRATE CLOSURE AND INSPECTION
     - No. 4A INSTALL LID
     - No. 4B INSTALL BANDING
   - No. 5 RADIOLOGICAL SURVEY

DESCRIPTION	STRM NO. / UNITS
TOTAL FLOW	STPH
SOLIDS FLOW	STPH
LIQUID FLOW	STPH
TOTAL FLOW	GPM
SOLIDS WT%	WT%
SOLIDS S. G.	-

NO.	ISSUE	BY	CHK'D	APP'D
2	CLIENT APPROVAL	DRB	BR	HH
1	CLIENT APPROVAL			
0	OFFICE CHECK			

HALLIBURTON NUS Environmental Corporation

NO.	DESCRIPTION	DATE
2	CLIENT APPROVAL	05-22-92
1	CLIENT APPROVAL	
0	OFFICE CHECK	

KEYWORDS:

DESIGNED	DRB	03/13/92
DRAWN	R.LEACH	04/24/92
CHECKED	BR	04/24/92
APPROVED	HH	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/PONDCRETE STABILIZATION PROJECT
POND SLUDGE PROCESS FLOW DIAGRAM
POND 207 A&B CASTING STATION

SIZE	DRAWING NUMBER	REV	SHEET
D	39717-0012	2	4 of 4

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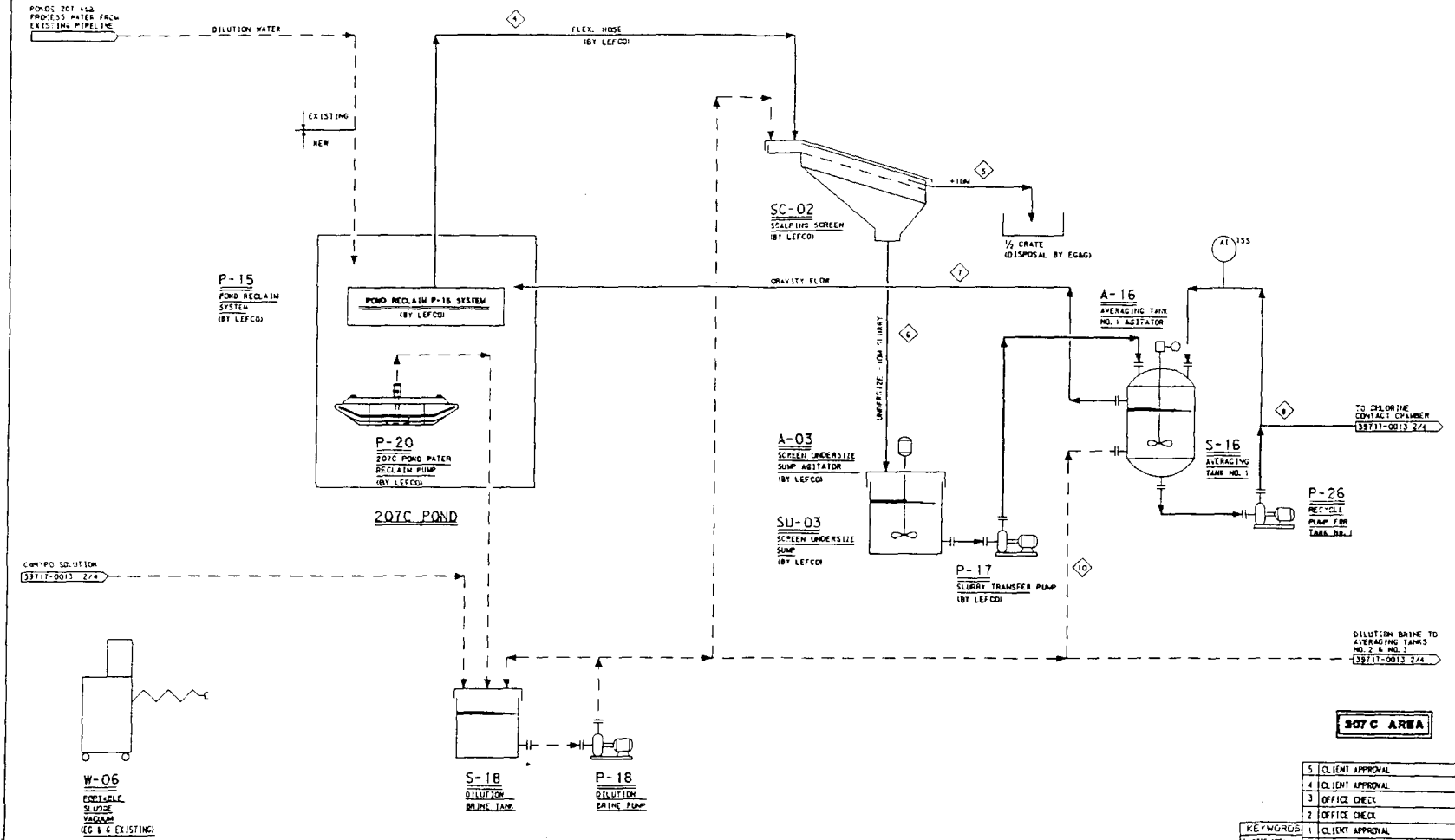
Figure 4b
Pond 207C and Clarifier CSS PFD



NOTES:
1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "430" PREFIX.
2. PIPING WITHIN SECONDARY CONTAINMENT WILL BE SINGLE WALL, OTHERWISE DOUBLE-WALL.
3. — — — DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH - SHORT TONS PER HOUR.
5. THIS DWG. SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE DILUTED CONTENTS OF 207C POND AND TBB CLARIFIER.
7. SECONDARY CONTAINMENT NOT SHOWN-SEE P&ID'S.
8. MATERIAL BALANCE IS BASED ON 10% SOLIDS FEED FROM POND 207C TO STABILIZATION. (REF. MATERIAL BALANCES FOR POND 207C, ISSUE: 2, REV. 4).
9. H=HYDRAULIC POWERED
10. AVERAGING TANK AGITATOR & RECYCLE PUMP ARE HYDRAULICALLY DRIVEN, HALLIBURTON MODEL # CWS-50E
11. THIS IS A SEMI-BATCH PROCESS. THE FLOWS SHOWN ARE BASED ON AVERAGE RATES.

NOTE: 8, 11

DESCRIPTION	STRM NO. / UNITS	4	5	6	7	8	10
TOTAL FLOW	STPH	61.62	0	61.62	56.42	5.21	0.01
SOLIDS FLOW	STPH	6.16	0	6.16	5.64	0.52	0.00
LIQUID FLOW	STPH	55.46	0	55.46	50.78	4.69	0.01
TOTAL FLOW	GPM	200.0	-	200.0	183.1	16.9	0.03
SOLIDS WT%	WT%	10.00	100.00	10.00	10.00	10.00	0.00
SOLIDS S. G.	-	2.12	2.12	2.12	2.12	2.12	-
SLURRY S. G.	-	1.23	-	1.23	1.23	1.23	1.18

NO.	REVISION	BY	CHKD	APPD
5	CLIENT APPROVAL	DRB	WCH	MH
4	CLIENT APPROVAL	DRB	WCH	MH
3	OFFICE CHECK			
2	OFFICE CHECK			
1	CLIENT APPROVAL			
0	PLAN C, POND 207C			

HALLIBURTON NUS Environmental Corporation

NO.	DESCRIPTION	DATE
5	CLIENT APPROVAL	05/22/92
4	CLIENT APPROVAL	04/27/92
3	OFFICE CHECK	04/13/92
2	OFFICE CHECK	04/01/92
1	CLIENT APPROVAL	03/11/92

KEYWORDS
1. 207C AREA
2. POND SLUDGE
3. STABILIZATION
4. FLOW DIAGRAM
5. REMOVAL
6. REMOVAL EQUIPMENT

	BY	DATE
DESIGNED	DRB	03/13/92
DRAWN	CEA	04/13/92
CHECKED	WCH	04/24/92
APPROVED	MH	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO
Rocky Flats Plant
GOLDEN, COLORADO
SOLAR POND/PONDCRETE STABILIZATION PROJ.
POND SLUDGE-PROCESS FLOW DIAGRAM
207C POND RECLAIM SYSTEM

SIZE D | DRAWING NUMBER 39717-0013 | REV 5 | SHEET 1 of 1

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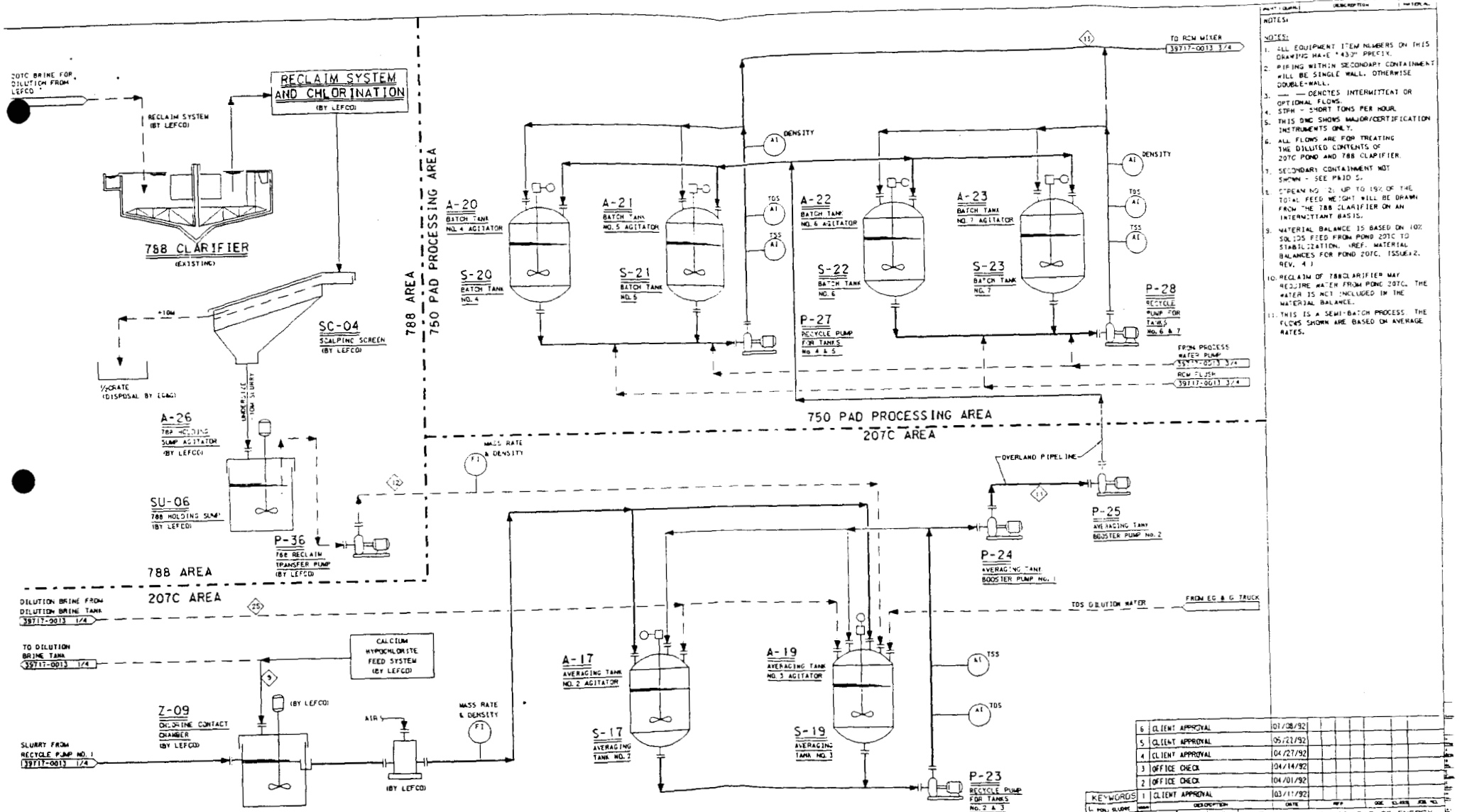

NOTES:

1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "A3" PREFIX.
2. PIPING WITHIN SECONDARY CONTAINMENT WILL BE SINGLE WALL. OTHERWISE DOUBLE-WALL.
3. — — DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH = SHORT TONS PER HOUR.
5. THIS DWG SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE DILUTED CONTENTS OF 207C POND AND 788 CLARIFIER.
7. SECONDARY CONTAINMENT NOT SHOWN - SEE PAID 5.
8. STREAM NO. 2: UP TO 15% OF THE TOTAL FEED WEIGHT WILL BE DRAWN FROM THE 788 CLARIFIER ON AN INTERMITTANT BASIS.
9. MATERIAL BALANCE IS BASED ON 10% SOLIDS FEED FROM POND 207C TO STABILIZATION. (REF: MATERIAL BALANCES FOR POND 207C, ISSUE#2, REV. 4.)
10. RECLAIM OF 788CLARIFIER MAY REQUIRE WATER FROM POND 207C. THE WATER IS NOT INCLUDED IN THE MATERIAL BALANCE.
11. THIS IS A SEMI-BATCH PROCESS. THE FLOWS SHOWN ARE BASED ON AVERAGE RATES.

DESCRIPTION	STRM NO. / UNITS	(11)	(12)	(13)	(25)	STRM NO. / UNITS	(9)
TOTAL FLOW	STPH	5.37	0.00	5.37	0.14	STPH	0.02
SOLIDS FLOW	STPH	0.54	0.00	0.54	0.00	STPH	0.02
LIQUID FLOW	STPH	4.83	0.00	4.83	0.14	STPH	0.00
TOTAL FLOW	GPM	17.4	0.00	17.4	0.5	FT3/HR	0.36
SOLIDS WT%	WT%	10.00	36.00	10.00	0.00	WT%	100.00
SOLIDS S. G.	-	2.12	2.17	2.12	-	-	2.35

NO.	REVISION	BY	CHK'D	APP'D
6	CLIENT APPROVAL	DRB	WCH	MM
5	CLIENT APPROVAL	DRB	WCH	MM
4	CLIENT APPROVAL	DRB	WCH	MM
3	OFFICE CHECK			
2	OFFICE CHECK			
1	CLIENT APPROVAL			
0	PLAN C. POND 207C			

HALLIBURTON NUS Environmental Corporation

NO.	DESCRIPTION	DATE
6	CLIENT APPROVAL	07/28/92
5	CLIENT APPROVAL	05/27/92
4	CLIENT APPROVAL	04/27/92
3	OFFICE CHECK	04/14/92
2	OFFICE CHECK	04/01/92
1	CLIENT APPROVAL	03/17/92

KEYWORDS: 1. POND SLUDGE 2. STABILIZATION 3. POND 207C 4. STABILIZATION 5. FLOW DIAGRAM 6. SOLIDS/LIQUIDS

	BY	DATE
DESIGNED	DRB	07/13/92
DRAWN	CA	04/14/92
CHECKED	WCH	04/24/92
APPROVED	MM	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE, GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/CONCRETE STABILIZATION PROJ.
POND SLUDGE - PROCESS FLOW DIAGRAM
207C BATCH PREPARATION

SIZE: D | DRAWING NUMBER: 39717-0013 | REV: 6 | SHEET: 2 of 4

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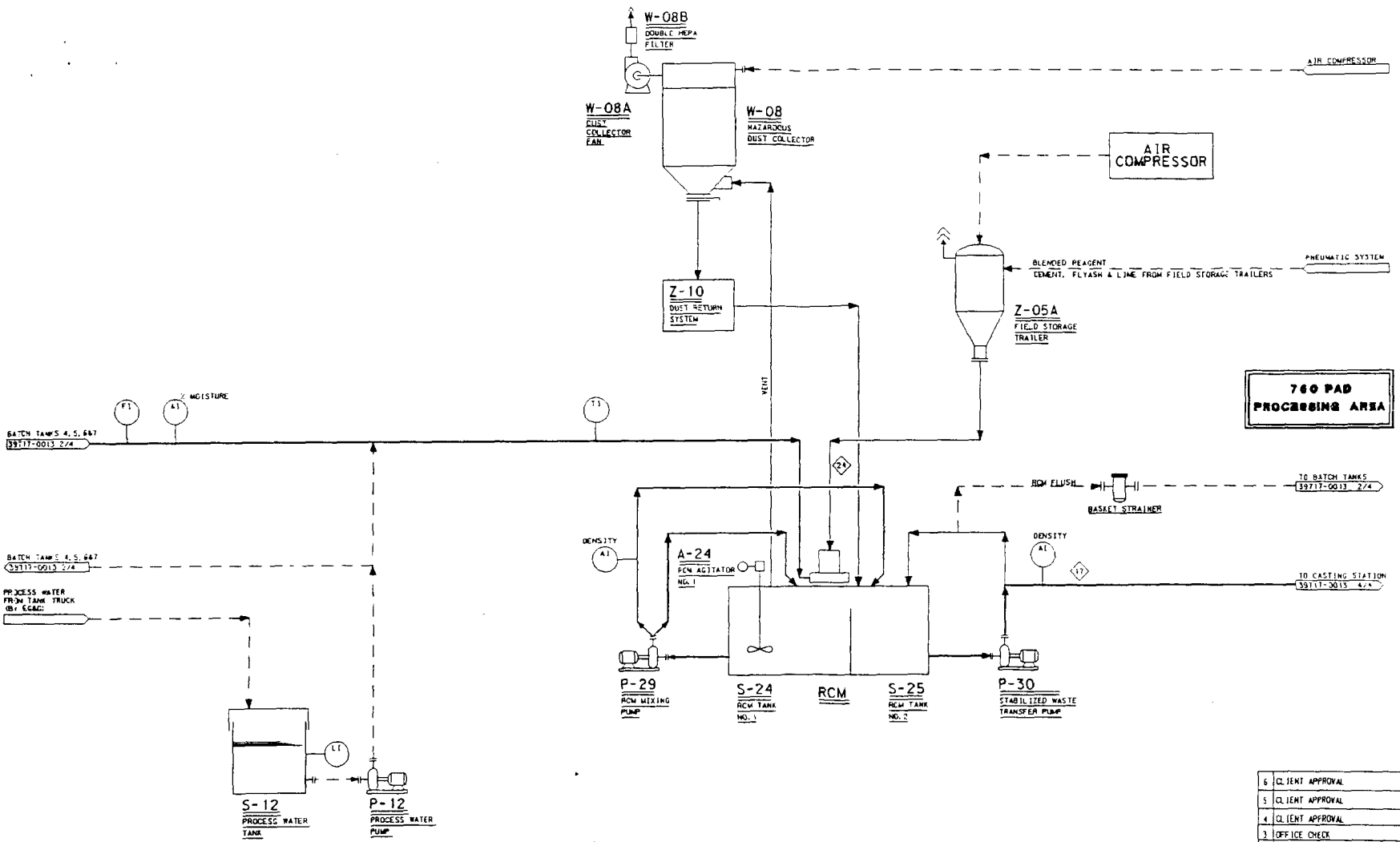

NOTES:

NOTES:

1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "430" PREFIX.
2. PIPING WITHIN SECONDARY CONTAINMENT WILL BE SINGLE WALL, OTHERWISE DOUBLE-WALL.
3. — — — DENOTES INTERMITTENT OR OPTIONAL FLOWS.
4. STPH = SHORT TONS PER HOUR.
5. THIS DWG SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
6. ALL FLOWS ARE FOR TREATING THE DILUTED CONTENTS OF 207C POND AND 788 CLARIFIER.
7. SECONDARY CONTAINMENT NOT SHOWN. SEE P&ID 5.

10. MATERIAL BALANCE IS BASED UPON 10% SOLIDS FEED FROM POND 207C TO STABILIZATION. (REF. MATERIAL BALANCES FOR POND 207C, ISSUE 2, REV. 4.).
11. THIS IS A SEMI-BATCH PROCESS. THE FLOWS SHOWN ARE BASED ON AVERAGE RATES.

IPTION	STRM NO. / UNITS	17	STRM NO. / UNITS	24
TAL FLOW	STPH	14.01	STPH	8.63
LIDS FLOW	STPH	9.17	STPH	8.63
UID FLOW	STPH	4.85	STPH	0.00
TAL FLOW	GPM	29.5	FT3/HR	212.8
LIDS WT%	WT%	65.50	WT%	100.00
LIDS S. G.	-	2.79	-	2.85
URRY S. G.	-	1.89	-	-

E: 10, 12

6	CLIENT APPROVAL	DRB	WCH	MH
5	CLIENT APPROVAL	DRB	WCH	MH
4	CLIENT APPROVAL	DRB	WCH	MH
3	OFFICE CHECK			
2	OFFICE CHECK			
1	CLIENT APPROVAL			
0	PLAN C, POND 207C			
NO.	ISSUE	BY	CHKD	APP'D

HALLIBURTON NUS Environmental Corporation

KEYWORDS
1. POND 207C
2. POND SLUDGE
3. STABILIZATION
4. CEMENT MIXER
5. FLOW DIAGRAM
SUBJECT/FACILITY
BUSINESS
CODE IDENTIFICATION NO.

6	CLIENT APPROVAL	07/08/92
5	CLIENT APPROVAL	05/22/92
4	CLIENT APPROVAL	04/27/92
3	OFFICE CHECK	04/14/92
2	OFFICE CHECK	04/01/92
1	CLIENT APPROVAL	03/11/92
0	PLAN C, POND 207C	01-22-92

DESCRIPTION | DATE | BY | APP | CODE | FLAGS | JOB NO.

TOLERANCES: FRACT. ± ; ANGLE ± ; DEC. ; MACH. SURF. AND SHARP EDGES ; NEXT ASSEMBLY ; SCALE

DESIGNED	DRB	03/13/92
DRAWN	CA	04/14/92
CHECKED	WCH	04/24/92
APPROVED	MH	
SUBMITTED FOR APPROVAL		
APPROVED FOR CONSTRUCTION		

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE — GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/PONDCRETE STABILIZATION PROJ.
POND SLUDGE PROCESS FLOW DIAGRAM
207C MIXING AND CASTING

SIZE: D | DRAWING NUMBER: 39717-0013 | REV: 6 | SHEET: 3 of 4

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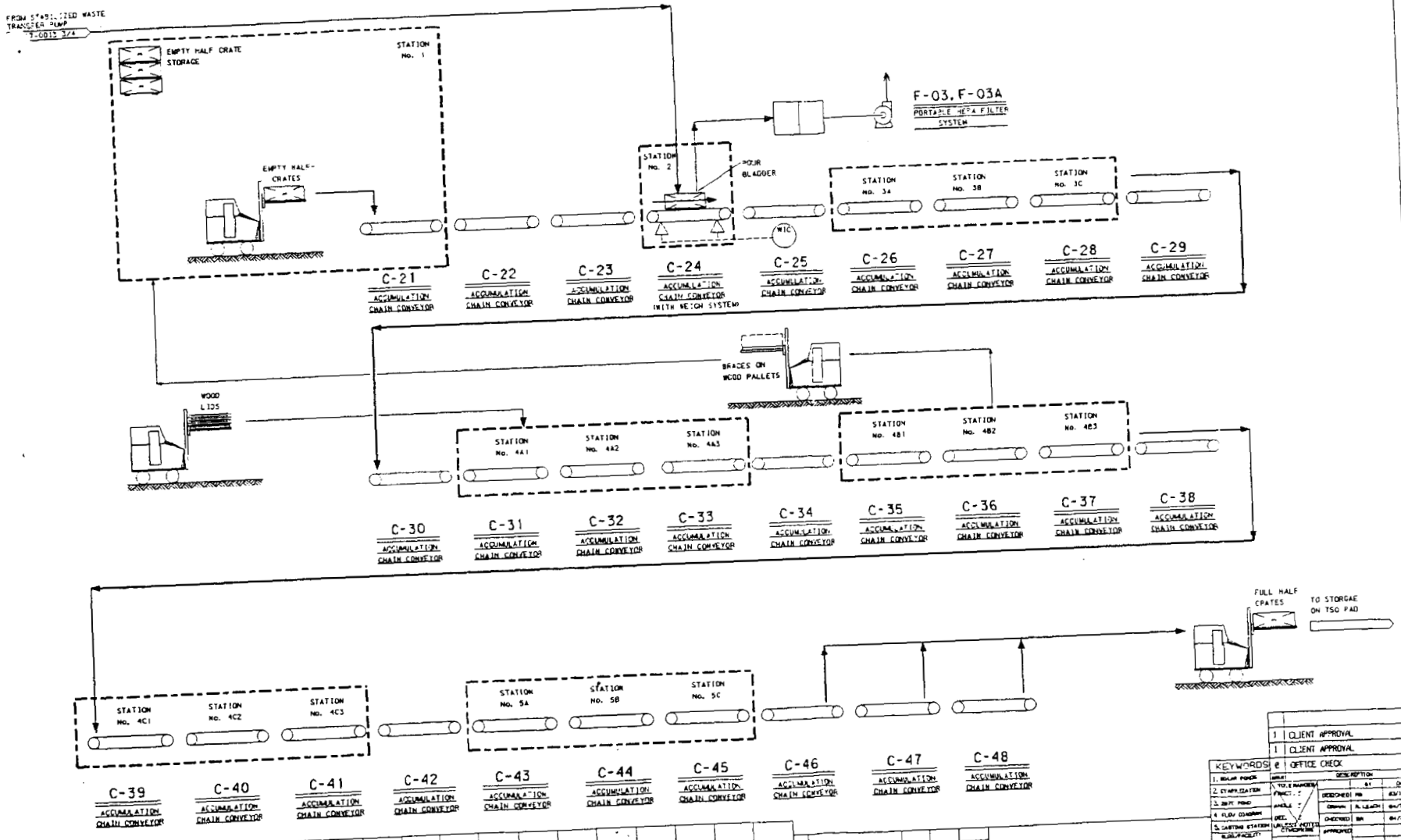

1. ALL EQUIPMENT ITEM NUMBERS ON THIS DRAWING HAVE "-430" PREFIX.
2. STPH - SHORT TONS PER HOUR.
3. THIS DRAWING SHOWS MAJOR/CERTIFICATION INSTRUMENTS ONLY.
4. STATION DESIGNATIONS:
   - NO. 1 HALF CRATE ASSEMBLY AREA
   - NO. 2 POURING AND INSPECTION STATION
   - NO. 3 BAG CLOSURE AND INSPECTION STATION
   - NO. 4 CRATE CLOSURE AND INSPECTION STATION
     - NO. 4A LID INSTALLATION
     - NO. 4B BRACE REMOVAL
     - NO. 4C APPLY BANDING
   - NO. 5 RADIOLOGICAL SURVEY STATION
5. EMPTY HALF CRATES RECEIVED WITH ALL INNER LINERS INSTALLED AND INSPECTED, READY FOR CASTING OF STABILIZED WASTES.

DESCRIPTION	STRM NO.
	UNITS
TOTAL FLOW	STPH
SOLIDS FLOW	STPH
LIQUID FLOW	STPH
TOTAL FLOW	GPM
SOLIDS WT%	WT%
SOLIDS S. G.	-
SLURRY S. G.	-

NO.	REVISION	BY	CHKD	APPD
2	CLIENT APPROVAL	DRB	BR	HH
1	CLIENT APPROVAL	DRB	BR	HH
0	OFFICE CHECK			

HALLIBURTON NUS Environmental Corporation

NO.	REVISION	BY	DATE
3	CLIENT APPROVAL		05-22-92
1	CLIENT APPROVAL		04/23/92
0	OFFICE CHECK		04/23/92

JR-1198
JR-1198

KEYWORDS: 1. SOLAR POND 2. STABILIZATION 3. BOTT POND 4. FLOW DIAGRAM 5. CASTING STATION SOLIDIFICATION REMOVAL AND DISPOSAL

	DESIGNED	MB	03/13/92
	DRAWN	R. LEACH	04/22/92
	CHECKED	BR	04/24/92
	APPROVED		

SUBMITTED
APPROVED
SCALE: NONE

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SOLAR POND/PONDCRETE STABILIZATION PROJECT
POND SLUDGE PROCESS FLOW DIAGRAM
207C POND CASTING STATION

SIZE	DRAWING NUMBER	FILE	SHEET
D	39717-0013	2	4 of 4

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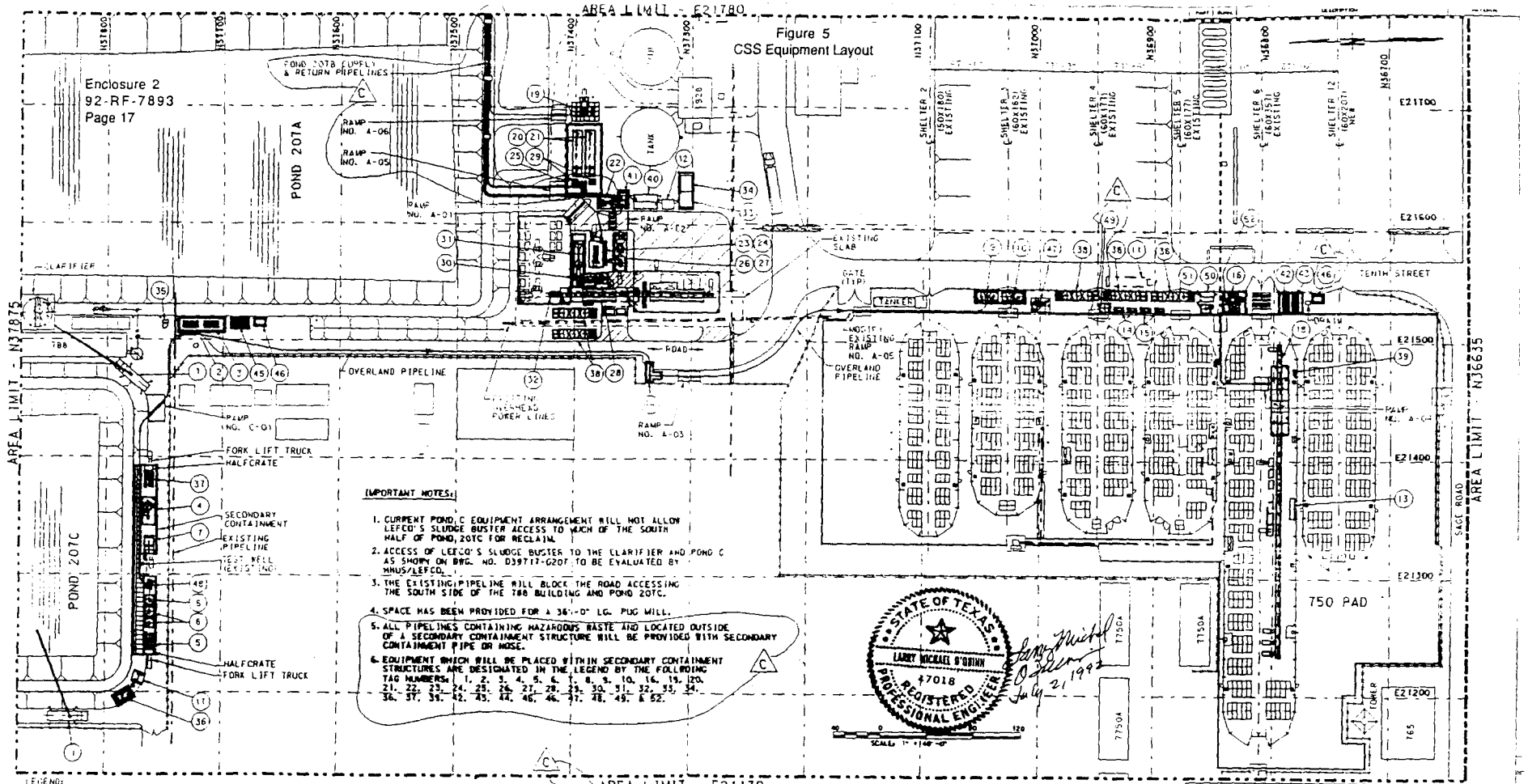
Enclosure 2
92-RF-7893
Page 17

Figure 5
CSS Equipment Layout



IMPORTANT NOTES:

1. CURRENT POND C EQUIPMENT ARRANGEMENT WILL NOT ALLOW LEFCO'S SLUDGE BUSTER ACCESS TO MUCH OF THE SOUTH HALF OF POND 207C FOR RECLAIM.
2. ACCESS OF LEFCO'S SLUDGE BUSTER TO THE CLARIFIER AND POND C AS SHOWN ON DWG. NO. D39717-G207 TO BE EVALUATED BY MMUS/LEFCO.
3. THE EXISTING PIPELINE WILL BLOCK THE ROAD ACCESSING THE SOUTH SIDE OF THE 788 BUILDING AND POND 207C.
4. SPACE HAS BEEN PROVIDED FOR A 36'-0" LG. PUG MILL.
5. ALL PIPELINES CONTAINING HAZARDOUS WASTE AND LOCATED OUTSIDE OF A SECONDARY CONTAINMENT STRUCTURE WILL BE PROVIDED WITH SECONDARY CONTAINMENT PIPE OR HOSE.
6. EQUIPMENT WHICH WILL BE PLACED WITHIN SECONDARY CONTAINMENT STRUCTURES ARE DESIGNATED IN THE LEGEND BY THE FOLLOWING TAG NUMBERS: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 39, 42, 43, 44, 46, 46, 47, 48, 49, & 52.

STATE OF TEXAS
LARRY MICHAEL O'BRIEN
47018
REGISTERED PROFESSIONAL ENGINEER
July 21, 1992

LEGEND:

TAG NO.	EQPT. NO.	DESCRIPTION
1	430-F-15	POND RECLAIM SYSTEM (LEFCO)
2	430-G-02E	PRIME GENERATOR (207 AREA)
3	430-G-02E	EMERGENCY GEN. (207 AREA)
4	430-S-18	DILUTION BRINE TANK
5	420-SC-02	SCALPING SCREEN (LEFCO)
6	430-S-16	AVERAGING TANK NO. 1
7	430-Z-09	CHLORINE CONTACT CHAMB (LEFCO)
8	430-S-17/19	AVERAGING TANK NO. 2 & 3
9	430-S-20/21	BATCH TANK NO. 4 & 5
10	430-S-22/23	BATCH TANK NO. 6 & 7
11	———	MOBILE BULK MATERIAL STORAGE
12	430-M-02	MOTOR CONTROL CENTER
13	430-M-03	MOTOR CONTROL CENTER
14	430-C-03/04	AIR COMPRESSORS (750 AREA)
15	430-F-05/06	AIR COMPRESSORS (750 AREA)
16	430-S-24	RCW
17	———	CONTROL ROOM
18	430-C-21/48	CHAIN CONVEYORS
19	430-SC-01	SCALPING SCREEN (LEFCO)
20	430-S-13	SURGE TANK NO. 1
21	430-S-14	SURGE TANK NO. 2
22	430-SU-01	TRANSFER SUMP
23	430-Z-03	FLOCCULANT SYSTEM
24	430-TH-01	ROTARY SCREEN THICKENER
25	430-P-10	EFFLUENT RECYCLE PUMP
26	430-S-05	DIRTY WATER SEPARATOR
27	430-S-06	PROCESS WATER TANK
28	430-SU-02	CEMENT FLUSH WATER SUMP
29	430-P-34/35	SURGE TANK PUMP *1 & *2
30	———	CASTING PUMP
31	430-MX-08	PUG MILL SYSTEM
32	430-C-06/20	CHAIN CONVEYOR
33	430-G-01E	EMERGENCY GEN. (207 AREA)
34	430-G-01P	PRIME GEN. (207 AREA)
35	430-M-05	MOTOR CONTROL CENTER
36	430-C-02	AIR COMPRESSOR (LEFCO)
37	430-SC-03	SCALPING SCREEN (LEFCO)
38	430-T-05	TRAILER-FIELD STORAGE, 1410 CF
39	430-A-08	HEPA FILTER
40	———	CONTROL ROOM
41	430-A-01	AIR COMPRESSOR (207 AREA)
42	430-G-03P	PRIME GENERATOR (750 AREA)
43	430-G-03E	EMERGENCY GENERATOR (750 AREA)
44	430-P-25	AVG. TANK BOOSTER PUMP *2
45	430-G-04	GENERATOR (LEFCO)
46	———	FUEL TANK (TYP.)
47	430-S-12	PROCESS WATER TANK
48	430-P-24	AVG. TANK BOOSTER PUMP *1
49	———	CEMENT DUST COLLECTOR
50	———	CONTROL ROOM
51	430-S-26	SCALE TANK
52	430-Z-10	HEPA FILTER

D39717-0201-01	KEY PLOT PLAN	C	LMO PE TX 47018	TDMS LMO
D39711-0200-01	PLOT PLAN	B	LMO PE TX 47018	TDMS LMO
		A	LMO PE TX 47018	TDMS LMO
		2	LMO PE TX 47018	TDMS LMO

Brown & Root Inc.
ENGINEERS • CONSTRUCTORS

REV	DESCRIPTION	DATE	BY	CHK	APP'D
C		07-02-92			JR 1193
B	GENERAL REVISION	06-30-92			JR-1193
A	ISSUED FOR CONSTRUCTION	05-12-92			JR-1198
2	ISSUE FOR CLIENT REVIEW/COMMENT	05-05-92			JR-1198
1	OFFICE CHECK	05-05-92			JR-1198

KEYWORDS: 201 & 750

DESIGNED	TDMS	07-18-91	
DRAWN	LMO	05-05-92	
CHECKED	LMO	05-05-92	
APPROVED	JZ	05-08-92	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE — GOLDEN, COLORADO

Rocky Flats Plant
GOLDEN, COLORADO

SID AIR POND/CONCRETE STABILIZATION PROJECT
GENERAL ARRANGEMENT
201 & 750 AREA PLOT PLAN

D 39717-0220 C 1 of 1

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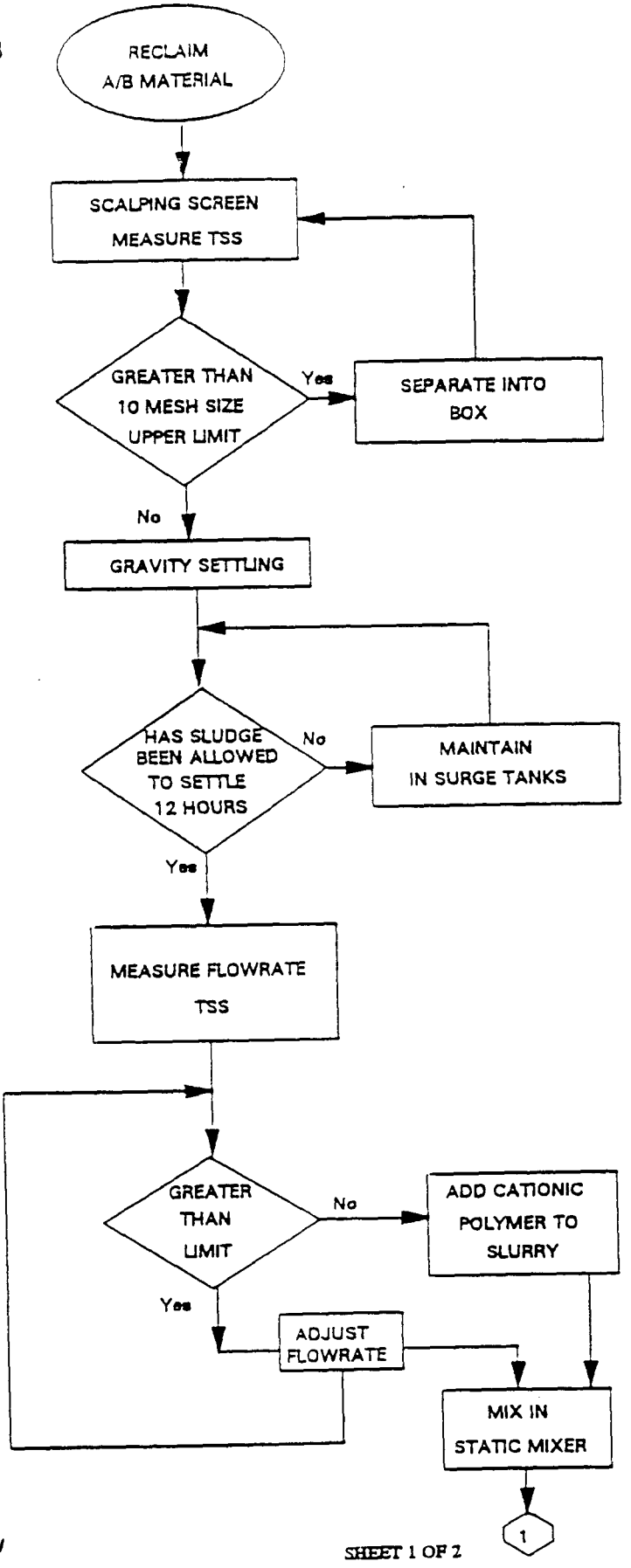
8 2

PROCESS CONTROL FLOW DIAGRAM

PONDS 207 A & B

DRAFT: 1

Enclosure 2
92-RF-7893
Page 18



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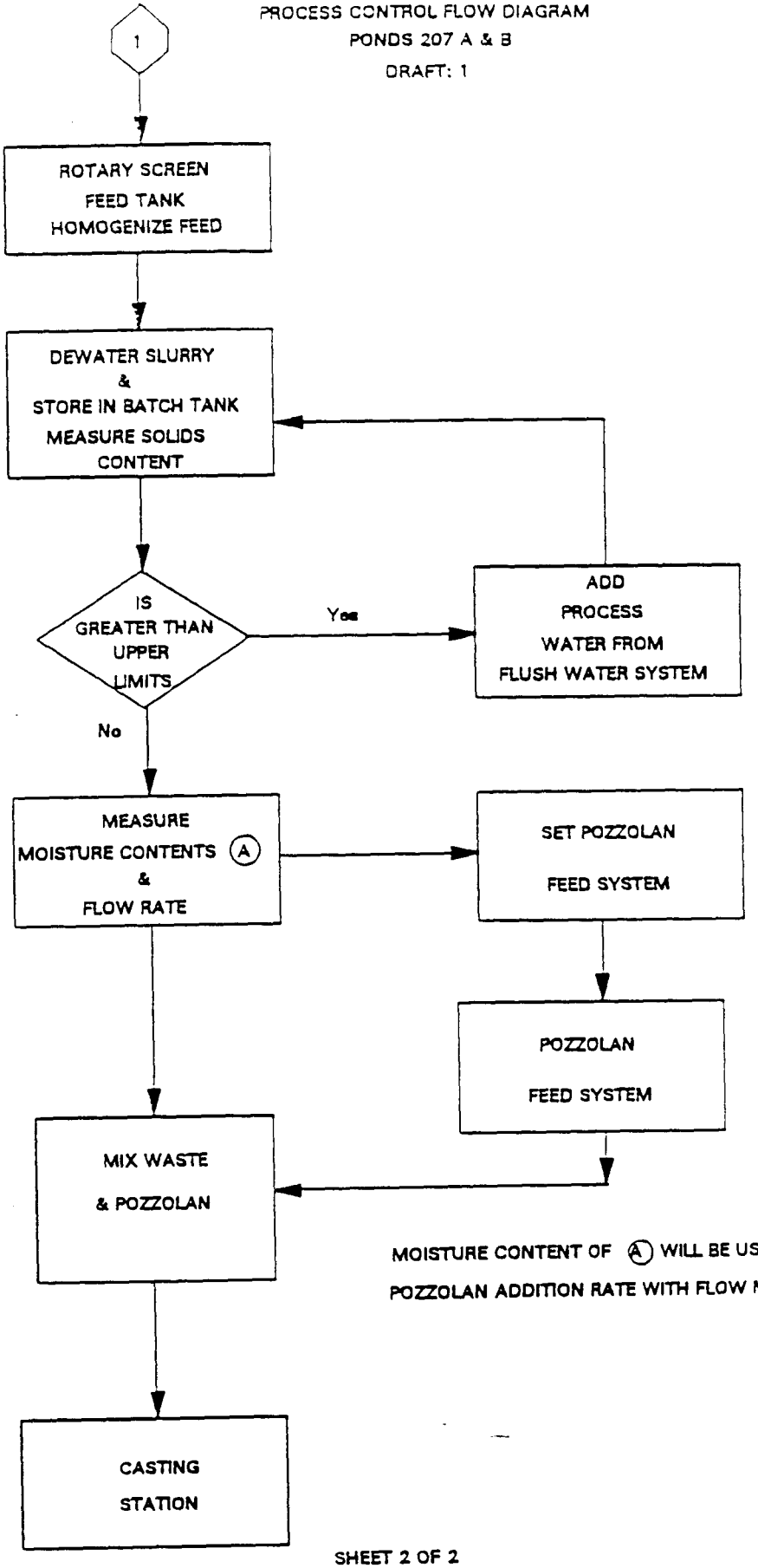
SHEET 1 OF 2

28

PROCESS CONTROL FLOW DIAGRAM
PONDS 207 A & B
DRAFT: 1



MOISTURE CONTENT OF (A) WILL BE USED TO CALCULATE POZZOLAN ADDITION RATE WITH FLOW METER

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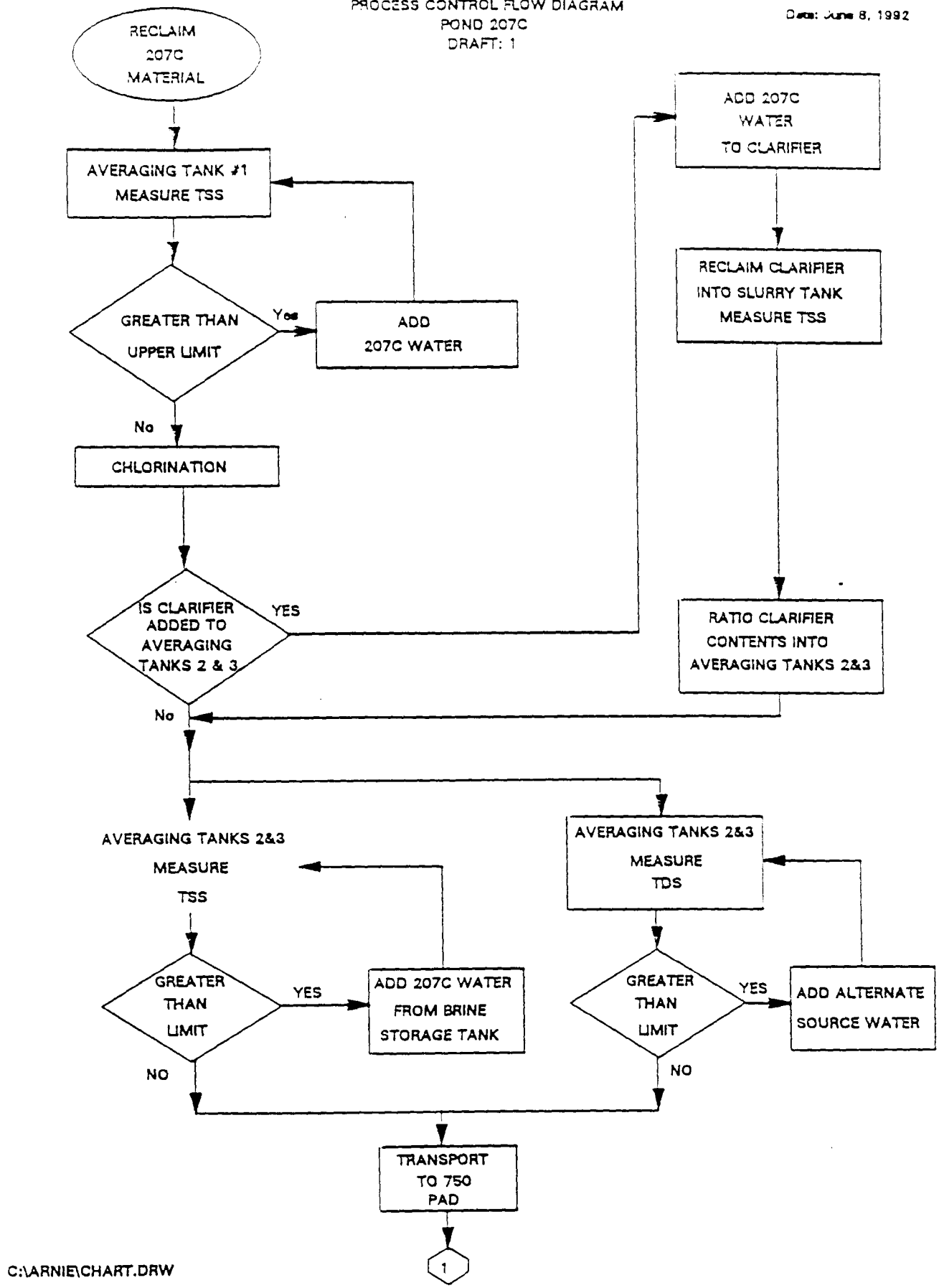
SHEET 2 OF 2

PROCESS CONTROL FLOW DIAGRAM
POND 207C
DRAFT: 1



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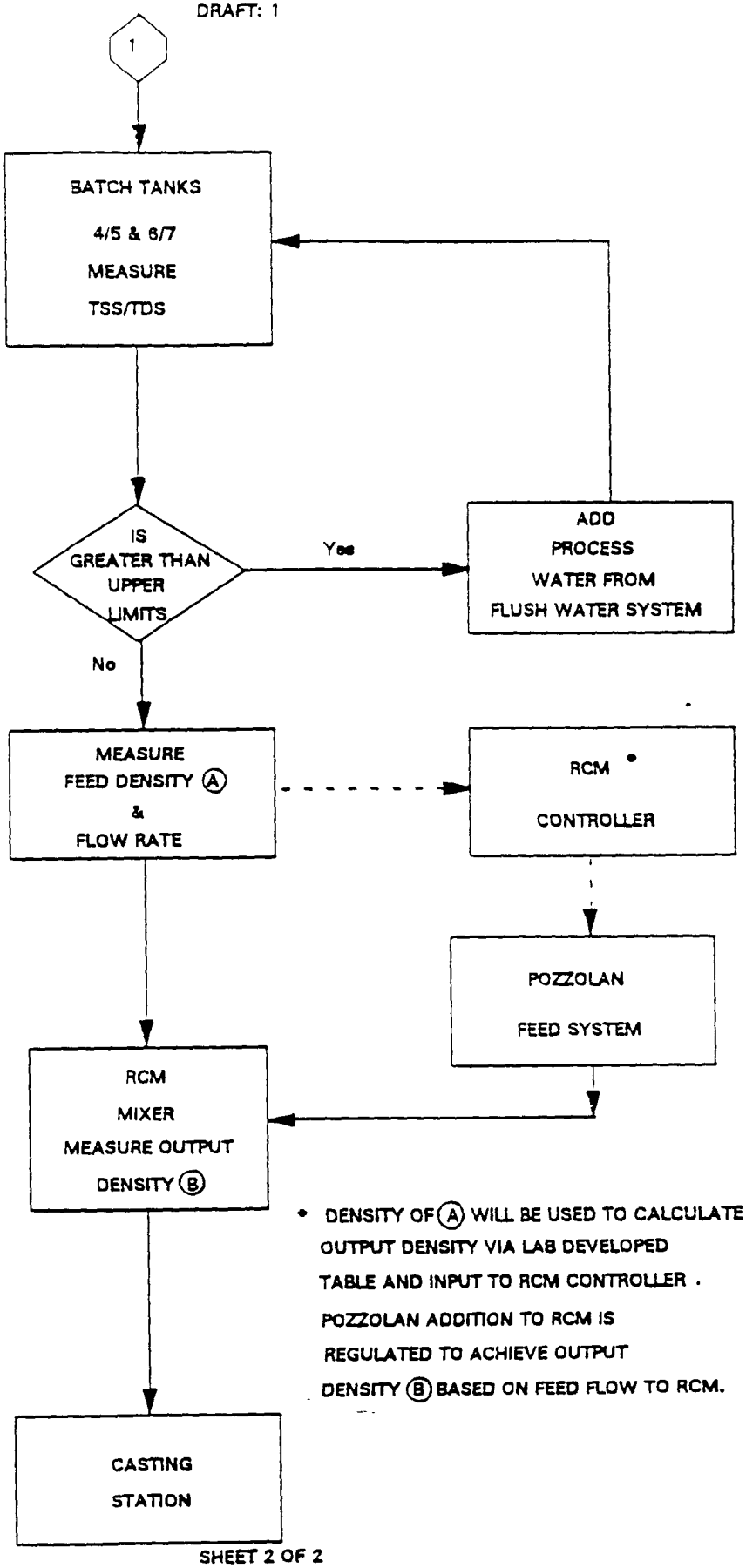
SHEET 1 OF 2

PROCESS CONTROL FLOW DIAGRAM
POND 207C
DRAFT: 1

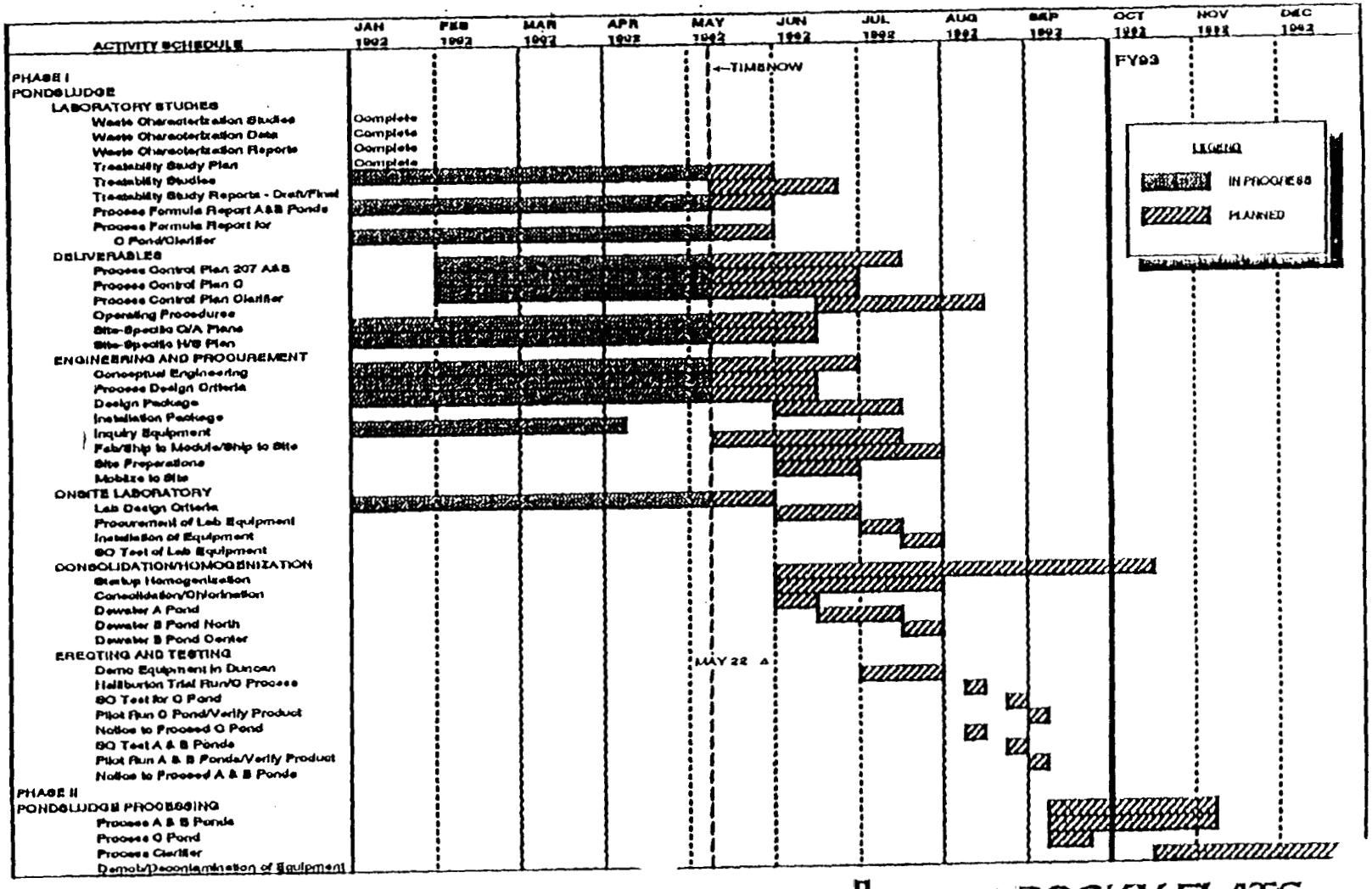


• DENSITY OF (A) WILL BE USED TO CALCULATE OUTPUT DENSITY VIA LAB DEVELOPED TABLE AND INPUT TO RCM CONTROLLER . POZZOLAN ADDITION TO RCM IS REGULATED TO ACHIEVE OUTPUT DENSITY (B) BASED ON FEED FLOW TO RCM.

C:\ARNIE\CHART2.DRW

SHEET 2 OF 2

OU 4 - SOLAR PONDS
PROJECT SCHEDULE - PHASE I & II POND SLUDGE



ROCKY FLATS

Figure 7
SEP Cleanout Project Schedule

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